MANORAMA

TELL ME WHY

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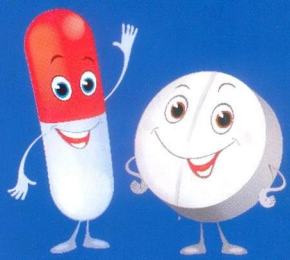

MILESTONES IN MEDICAL SCIENCE

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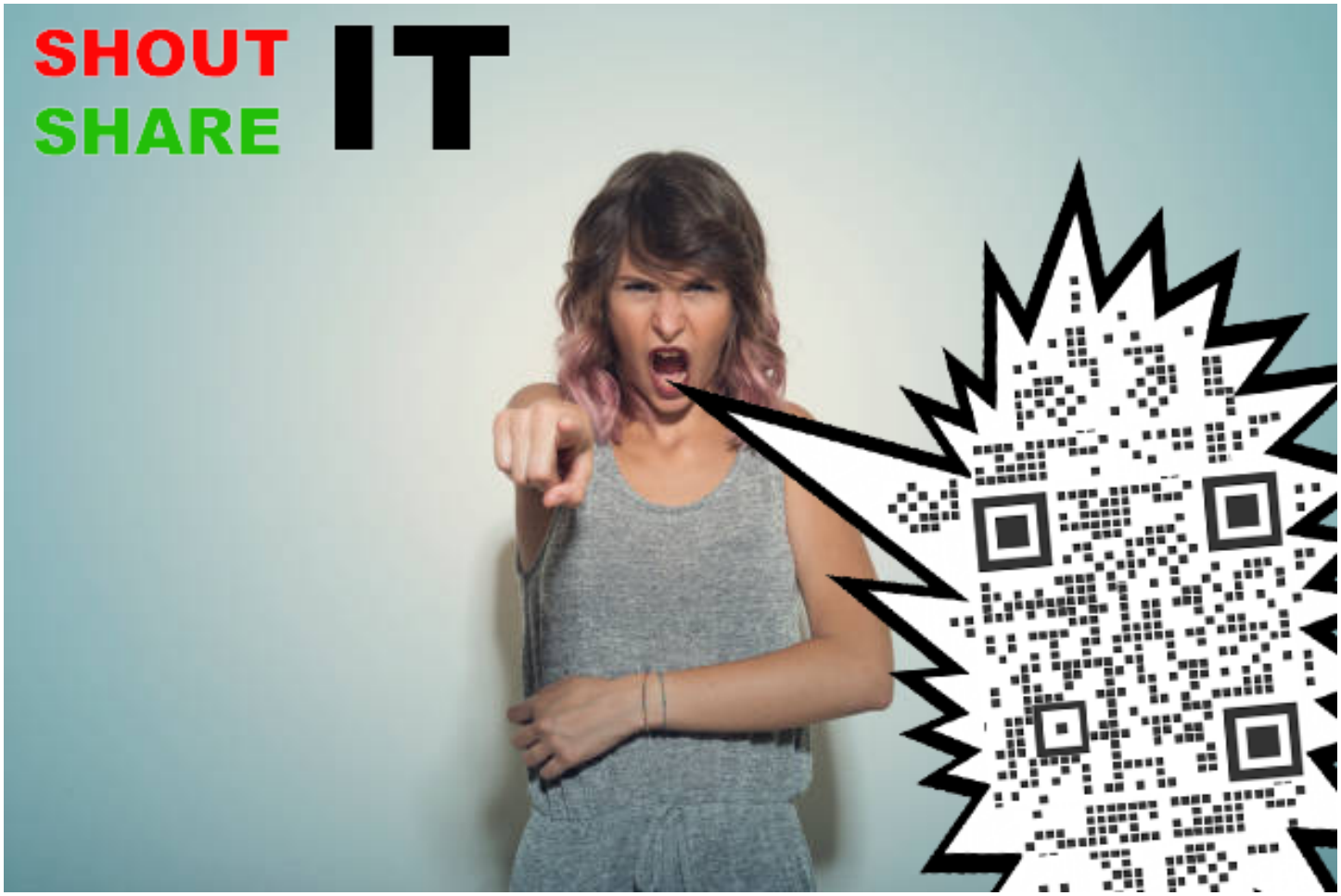
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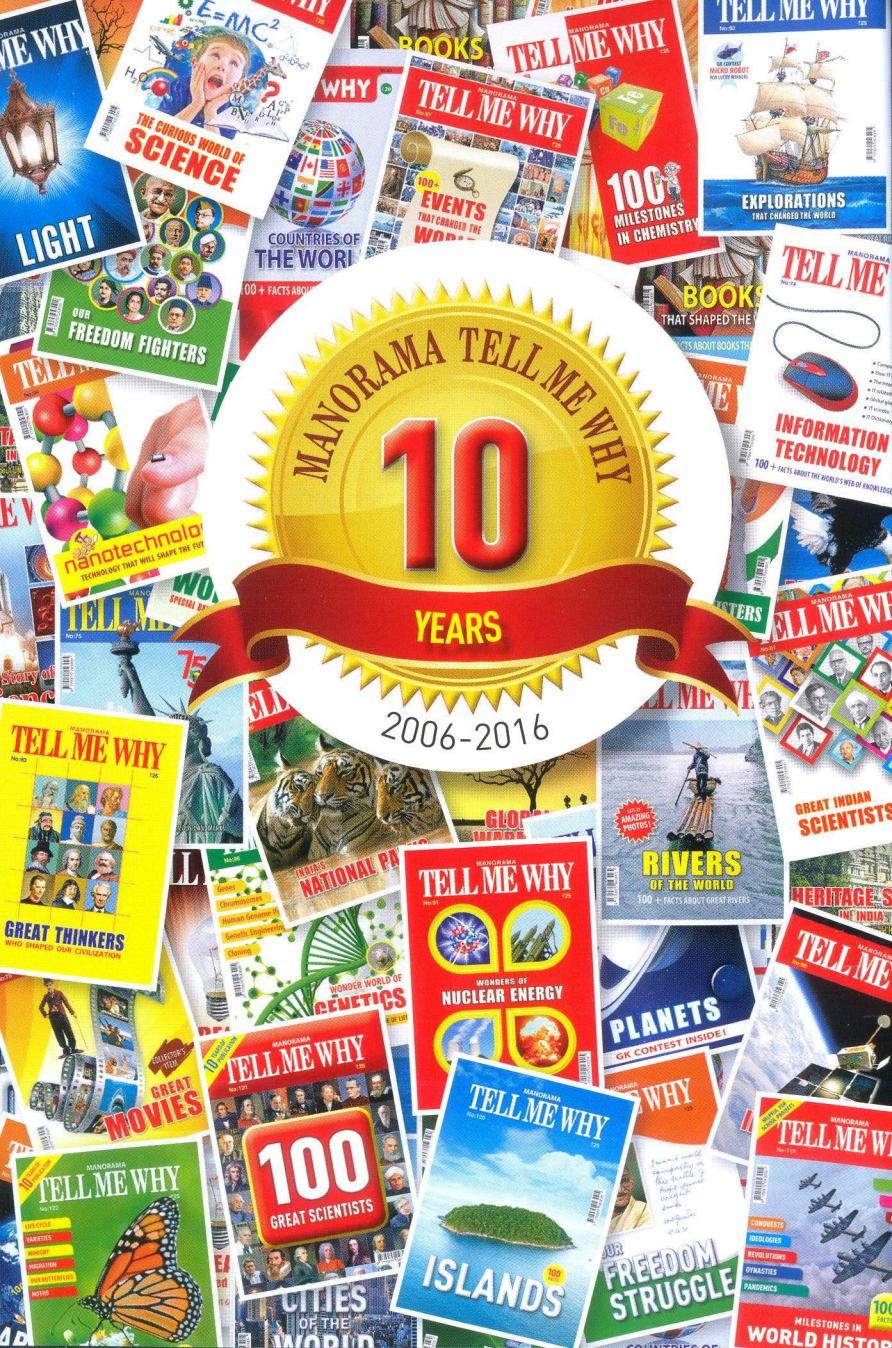
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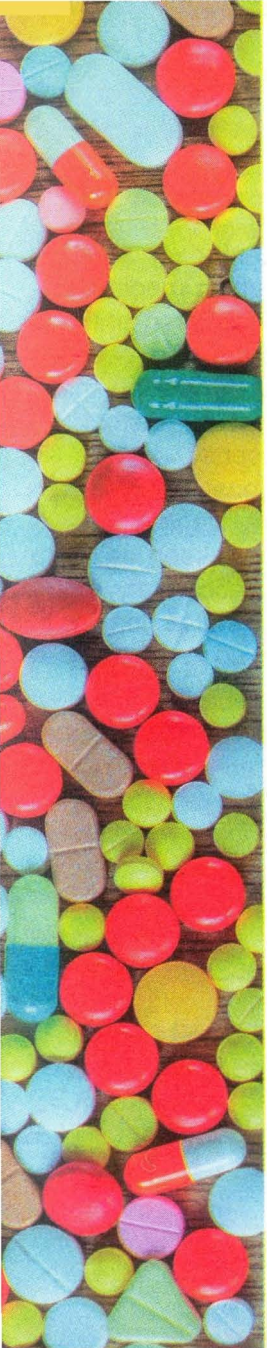


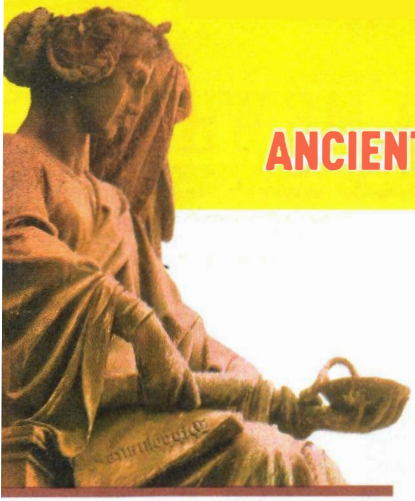
MANORAMA
TELL ME WHY
December 2016 • Volume: 10 • No: 12
FROM THE HOUSE OF MAGIC POT, THE WEEK, MANORAMA YEARBOOK, VANITHA & THE MALAYALA MANORAMA DAILY

WORLD OF MEDICINE

When you're sick, your parents probably take you to the doctor. After examining you, the doctor prescribes medicines. But things were different in ancient times. A sick person was taken to witch doctors, because it was believed that illness was caused by evil spirits. Witch doctors performed magic to exorcise these spirits. If this failed, the witch doctors performed an operation called trepanning, which meant boring a hole through the skull so that the evil spirits trapped in the body, would escape. This was the primitive way practiced in many parts of the world.

However, discoveries and innovations in medical science have changed everything.

This issue of Tell Me Why features breakthroughs in medical science.



ANCIENT WISDOM

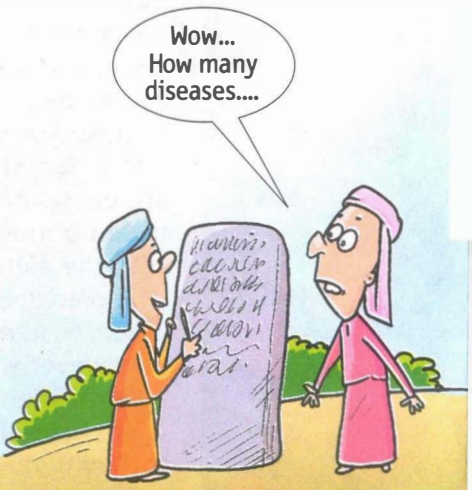
Why is the 'The Treatise of Medical Diagnosis and Prognosis' so important?

'The Treatise of Medical Diagnosis and Prognosis' is a very long name for 40 clay tablets that were written by the Ancient Mesopotamians, long before Christ was born.

These tablets describe in great detail the symptoms for about 3000 different diseases, and their outcome.

The tablets were believed to have been inscribed around 1600 BC, and contain the medical knowledge accumulated over several centuries. Most of these Mesopotamian medical tablets were not discovered until the nineteenth century, and because of difficulties with translation, many of them were not understood by scholars until recently.

The descriptions of diseases contained in this diagnostic treatise demonstrate a keen ability to observe, and to accurately report conditions. The treatise deals with every illness known to the world at that time.



Why will the name of Alcmaeon always be remembered?

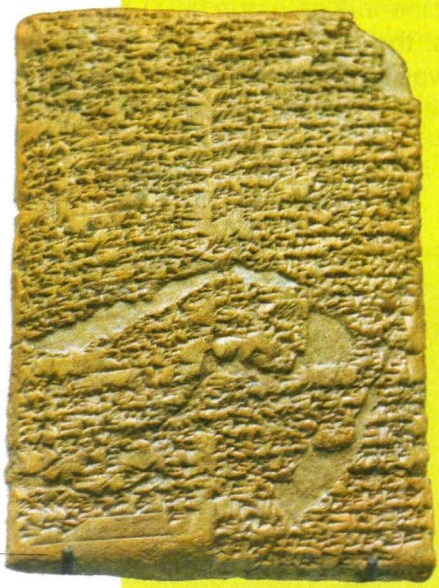
Alcmaeon of Croton was an early Greek medical writer and philosopher-scientist. He was a thinker of considerable originality.

Alcmaeon was the first to identify the brain as the seat of understanding, and to distinguish understanding from perception. He thought that the sensory organs were connected to the brain by channels. He was also the first person in the Greek tradition to argue that the brain was the seat of thought and to address a series of issues that would become standard in later writings on physiology, such as the causes of sleep, waking, and death.

Finally, Alcmaeon gave the first argument for the immortality of the soul. He published one book in the late sixth or first half of the fifth century BC, of which only two or three fragments survive.

Code of Hammurabi

The Code of Hammurabi is a well-preserved Babylonian law code of Ancient Mesopotamia. It laid down rules of conduct for surgeons, and guidelines governing the performance of operations.

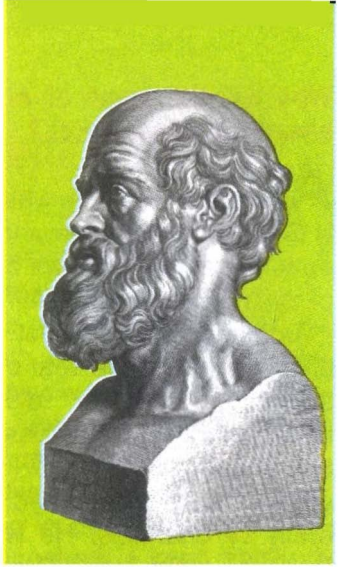


Code of Hammurabi

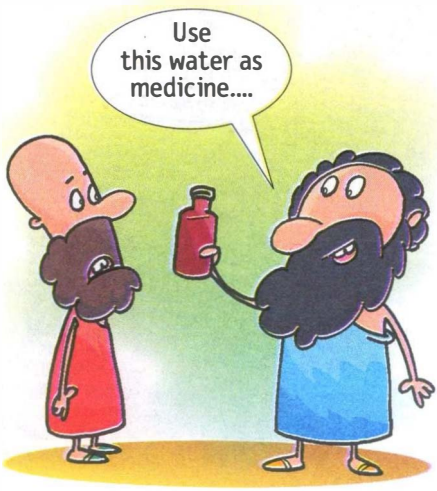
How did Hippocrates change the course of medical history?

Hippocrates, a physician from the island of Kos in ancient Greece, is known as the 'Father of Modern Medicine'. Hippocrates was given credit for healing many important people, such as Macedonia's king, whom he had treated for tuberculosis. His dedication to healing was tested when he fought the plague in Athens for three years from 430-427 BC.

Later, Hippocrates taught medicine, and started a school for medicine in Kos around 400 BC. One of the main things that he taught was that it was important to keep a record of the patient's condition and symptoms. He did not believe in superstitions, but based his medical practice on observations and on the study of the human body.



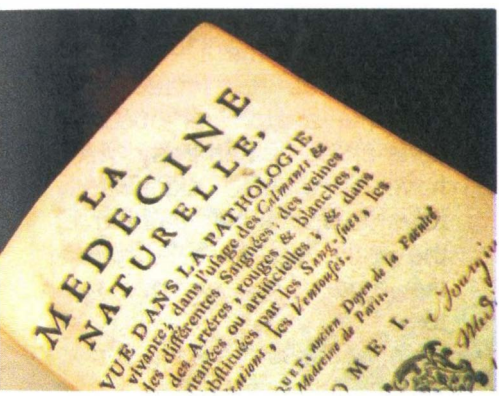
Hippocrates



A body of writing that has been attributed to Hippocrates is the Hippocratic Corpus. It contains 60 treatises, and they are considered to be the oldest known books about medicine. The Hippocratic Oath is a document on medical practice ethics and morals that is also credited to him.

Who was Diocles?

Diocles of Carystus was a Greek physician who was regarded in antiquity as second only to Hippocrates. He is believed to have lived in the first half of the 4th century BC. Diocles probably learned his trade from his father, who was a physician, for medicine in those times was a craft that was often passed from father to son.



An Old Medical Book

He wrote several medical works, including the first separate treatise on anatomy. Diocles collected a large number of herbs and poisons, and went into great detail specifying their qualities and powers.

His best-known contributions to medicine are in the area of practical medicine, diet, nutrition and hygiene. Diocles also played a key role in ancient times in the development of dissection and anatomical research.

Bore to Cure

In ancient times, it was believed that all illnesses could be cured by boring a hole in your skull! This is known as trepanning. Many different civilizations, from the Romans and Chinese, performed the procedure, using sharpened pieces of flint as a surgical tool. It may have had a practical effect – to relieve pressure on the skull after an injury. However, many people in ancient times believed that it gave a demon that was trapped in the body, a hole to escape!

Herophilos

Why is Herophilos a legend in medicine?

Herophilos began practicing medicine in the city of Alexandria around the second century BC. He is recognized as the first person to perform systematic dissection of the human body, despite the taboos that prevailed at that time.

Herophilos has made phenomenal anatomical observations of the human body which have contributed significantly towards the understanding of the brain, eye, liver, reproductive organs, and nervous system.

He was also the earliest person to carry out the first known autopsies for characterizing the cause of disease. Herophilos penned at least eleven treaties, which unfortunately, were lost during the great fire in the Library of Alexandria, where his works were stored.

However, his anatomical knowledge has been passed down through the generations, providing vital inputs that have played an important role in understanding the structure and working of our bodies.

Why are the contributions of Pedanius Dioscorides milestones in medical science?

Pedanius Dioscorides was a physician who lived about two thousand years ago. He travelled throughout the Roman Empire with Emperor Nero's army, and collected samples of the local medicinal herbs everywhere he went. He turned his passion for plants and other medicinal substances into a monumental reference work on herbs and pharmacology.

Pedanius Dioscorides

Erasistratus

Erasistratus was a well-known physician who worked with Herophilos. Together, they contributed considerably to medical investigations and teaching in Alexandria. While Herophilos was very talented in describing human anatomy, Erasistratus contributed to physiology and functional anatomy.

Pedanius Dioscorides wrote a series of books called 'De Materia Medica' - five books in one volume. Over 600 remedies are described, and about a fifth of them are still considered to be effective.

Although he wrote his book in Greek, it was quickly translated into Latin, and subsequently, into other languages.

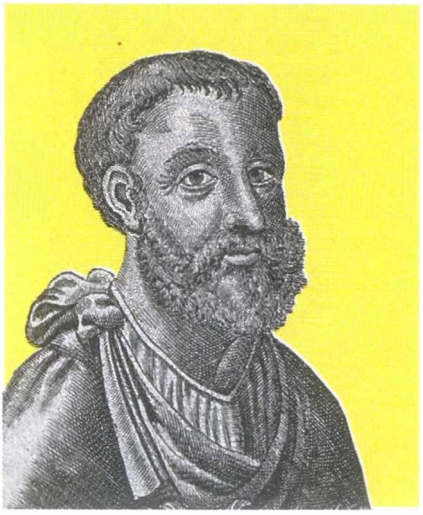
The work of Pedanius Dioscorides remained the prime authority on herbs and other medicinal substances in the West, and all over the world, for over 1500 years.

What was the influence of Galen on medicine in ancient times?

Galen was a Greek who became the Roman Empire's greatest physician. He spent 12 years learning all the different doctrines of ancient medicine from around the Mediterranean. He saw both ineffective and effective techniques, and he applied his own skills to develop a range of effective treatments for different diseases.

Galen consolidated the work of previous Greek medical researchers, adding the results of his own research, to create an incredibly long-lasting medical doctrine. He had great expertise in anatomy, pharmacology, and therapeutic methods. This brilliant physician was the doctor to three emperors of the Ancient Roman Empire.

In fact, his ideas dominated the Western and Arab world for close to 1500 years. Galen is renowned for bringing philosophy into medicine, and we know more about him than other ancient scientists, because of the great number of books that he wrote.



Galen

MEDICINE IN THE MIDDLE AGES

What was the role of Ibn Sina in Asian medicine?

Ibn Sina, was the most famous of all the philosopher-scientists during the Middle Ages. He was a Persian, and known to Europeans as Avicenna. By the time he was eighteen, he was a successful doctor. Ibn Sina had many new scientific ideas and he published these ideas in his 'Kitab al-Shifa', or 'The Book of Healing', which was an encyclopaedia.

He also wrote medical textbooks. Ibn Sina may have been the first person to realize that you could catch diseases like measles and smallpox from other people. He suggested quarantining sick people - or keeping them away from other people - for forty days, to prevent such diseases from spreading. All his books - the Book of Healing and the medical textbooks - were used by later doctors all over the Middle East.

Once they had been translated into Latin, they were used all over Europe too, throughout the Middle Ages.

Ibn Sina

AMAZING

Fluid Balance

According to the Ancient Greeks, the body was composed of four fluids, which corresponded to the four elements. The Greeks believed that a person fell ill when the balance between the fluids was disturbed.

Al Zahrawi

What were Al Zahrawi's contributions to surgery?

Al Zahrawi is considered to be the greatest medieval surgeon. His comprehensive medical texts shaped European surgical procedures up until the Renaissance. His greatest contribution to history is 'Kitab al-Tasrif,' a thirty-volume collection of medical practice, of which large portions were translated into Latin, and into other European languages.

It was used as standard reference work in the subject in all the universities of Europe for over five hundred years. The contents of the book show that Al Zahrawi was not only a medical scholar, but a great practicing physician and surgeon.

The book contains the earliest pictures of surgical instruments in history. Zahrawi classified 325 diseases, and discussed their symptoms and treatments. He also described, for the first time in medical history, a haemorrhagic disease transmitted by mother to their male children. Today, this disease is called haemophilia.

What was Abu Bakr al Razi's most significant contribution to medical history?

Abu Bakr al Razi was a Persian physician, alchemist, philosopher, and important figure in the history of medicine. He was a keen experimenter and observer.

As director of a large hospital in Baghdad, and the physician to the royal court, he engaged in medicine on a practical level. These experiences shaped his writings. He saw the importance of recording a patient's case history, and made clinical notes about the progress and symptoms of different illnesses, including his own.

One of his most important contributions was the discovery that smallpox and measles were different diseases. Previously, they were lumped together simply as a disease that caused rashes.

However, through careful observation, Al Razi recorded the differences in appearance of the skin inflammations, as well as the accompanying physical symptoms. He deduced correctly, that they were indeed two distinct diseases. Al Razi wrote numerous books on a range of medical and scientific subjects. 'The Al-Mansuri' and 'Al-Hawi,' his encyclopedic reviews of medicine, were translated into several languages, and became a standard text for Persian and European medical students for centuries.

Abu Bakr al Razi

Leonardo da Vinci

Why is Leonardo da Vinci one of the titans of medical history?

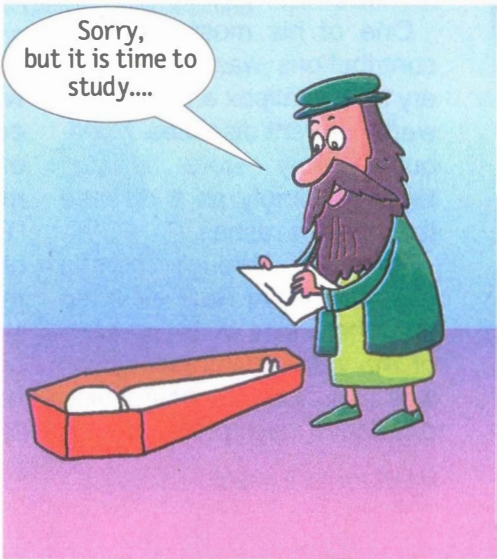
Leonardo da Vinci, one of the greatest inventors and artists of the Renaissance period, also made important contributions to medicine. One specific area that he focused on was the human anatomy.

During his lifetime, Leonardo dissected at least 30 corpses—both diseased and healthy—to get a full understanding of the human body. Da Vinci was among the first to provide both accurate drawings and explanations of the anatomy of

STAR FACT

Talented

Leonardo da Vinci was first presented at the Milanese Court not as an artist or inventor. He first became famous as an accomplished player of the lyre, a musical instrument.



the human body, and he filled many notebooks with detailed information for medical students and physicians.

One of the most famous robots found in da Vinci's notebooks, is one designed as a suit of armour that could stand, sit, wave its arms, and raise its visor through a series of pulleys and mechanics. Leonardo's robot and his accurate sketches of the human anatomy inspired modern scientists to create a surgical robot which was named after him.

This surgical robot is used today to perform many surgeries such as heart surgery, prostate surgery, hysterectomies, and joint-replacements. Da Vinci also contributed to the development of artificial limbs and synthetic organs.

What was the important contribution made by Andreas Vesalius?

Andreas Vesalius was a Belgian physician whose dissections of the human body, and descriptions of his findings, helped to correct many existing misconceptions. All his research findings were recorded in a book called 'On the Fabric of the Human Body.' This book is considered to have the most beautiful drawings and sketches of such wonders as the incredible precision of the human muscles.

Andreas Vesalius

In fact, Vesalius' exceptionally detailed muscle drawings in this book changed medical history for all time. His discoveries covered the skeletal system, muscular system, vascular and circulatory system, nervous system, abdominal organs, the heart, and the brain.

Vesalius proved that all nerves come not from the heart, but from the brain. He declared that the brain is the transmitter of sensation and motion, and that it is the brain, that makes us function.

It is no wonder then that 'On the Fabric of the Human Body' is considered to be a milestone in medical science.

What changes did Ambroise Pare bring about?

Ambroise Pare, a Frenchman, is widely considered the greatest surgeon of the sixteenth century.

In 1536, Pare joined the army as a regimental surgeon, and soon became so famous that before the end of his career, he had acted as a surgeon to four French kings as well.

It was during a siege that Pare made his great discovery. At that time, gunshot wounds were a new medical condition. They were considered poisonous, and routinely treated by sealing them with boiling oil. When Pare ran out of oil during the siege, he turned instead to simple dressings and soothing ointment, and immediately noted the improved condition of his

Ambroise Pare

patients. Pare popularized this revolutionary treatment in his treatise 'Method of Treating Wounds' in 1545.

His second important contribution to medicine was his promotion of ligature, or tying of blood vessels, to prevent bleeding during amputations.

Pare's greatest accomplishment, aside from actually coming up with new surgical techniques, was to spread this information among other surgeons, elevating surgery's status to a professional level, and paving the way for vast improvements in surgical care.

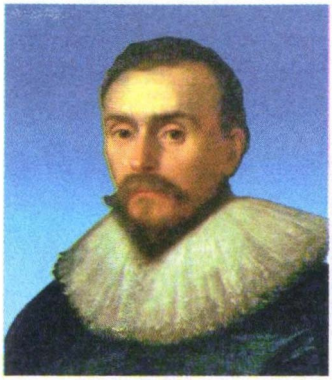
Why was the invention of the microscope a turning point in medical history?

The invention of the microscope cannot be credited to just one person. It is believed that even thousands of years ago, instruments for magnifying objects were known to the ancient civilizations.

The modern form of the microscope was developed in the 16th century by Zacharias Janssen, a Dutch spectacle-maker. Microscopes have proved to be a turning point in the history of medicine. They are one of the most important diagnostic tools for doctors to examine tissue samples.

Zacharias Janssen

Today's highly sophisticated electron microscopes enlarge the view of tiny viruses, which allows scientists to develop vaccines and cures for infectious diseases in humans and animals. Their importance in medicine cannot be over emphasized, for they are responsible for the great strides being made in this field.



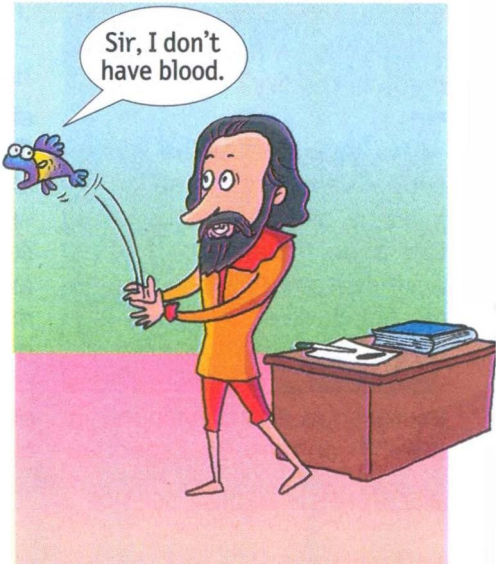
William Harvey

What was the revolutionary concept introduced by William Harvey?

William Harvey was the first researcher to discover the circulation of blood through the body. Until then, people were not aware that blood travels through the body and is pumped through its course by the heart.

Harvey, an Englishman, was a very successful 17th century physician. By dissecting both living and dead animals, Harvey became convinced that the ancient Greek ideas about blood movement were wrong.

Harvey first studied the heartbeat, and established the existence of the pulmonary, or the heart-lung-heart circulation process. He also noted the one-way flow of blood. When he also realized how much blood was pumped by the heart, he realized there must be a constant amount of blood flowing through the arteries, and returning through the veins of the heart. Harvey thus deduced that blood moves in a continuous circular flow. This revolutionary idea



Harvey Honoured

William Harvey made a breakthrough discovery about the circulation of blood. He became world renowned for his findings, and after his death, a hospital was built in his name near his birthplace in Folkestone, England.

became the basis for all further medical research on the heart and lungs.

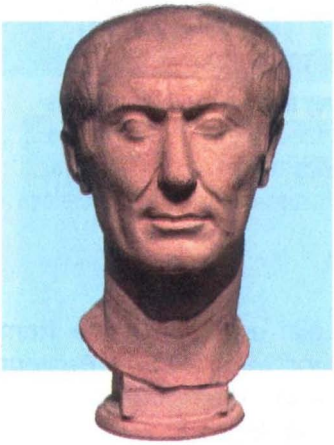
What was the medical significance of the discovery of bacteria?

Antonie van Leeuwenhoek, a Dutch cloth merchant, was the first person to see bacteria. Bacteria are one-celled organisms that you can see only through microscope. Though they are all around us, it was only in 1674 that they were actually discovered.

For almost two centuries, the knowledge that the world teemed with small organisms was regarded as an interesting, but rather irrelevant fact. It was a long time before researchers worked out that bacteria could be a factor in causing some of the diseases that passed from one person to another.

Proof of this was put forward by several scientists, but the most crucial evidence came from the work of Louis Pasteur and Robert Koch in the 1860s and 1870s. The discovery of bacteria proved to be a turning point in medical history, as it helped doctors to understand better the reasons and nature of different diseases.

Antonie van Leeuwenhoek



Bust of Julius Caesar

First Microbiologist

Antonie van Leeuwenhoek studied microscopes as a hobby. In 1674, he took the plaque from between his own teeth, and studied it under a microscope. He was astonished to see many little organisms moving about. These were bacteria, and today, this cloth merchant is considered to be the first microbiologist!

What is a caesarean delivery?

A caesarean delivery is a surgical procedure in which the baby is taken out of the mother's uterus through an incision made in the abdomen.

There are many reasons why a doctor might recommend a cesarean delivery. Some cesareans occur in critical situations, some are used to prevent critical situations. The introduction of this procedure has drastically reduced the number of deaths that were previously associated with childbirth.

Caesarean deliveries can save the life of a mother or child- or both. Interestingly, the history of

caesarean delivery dates back as far as Ancient Roman times. It is believed that the mother of one of Julius Caesar's ancestors had died during childbirth. The baby however, was saved by being taken out of the womb through an incision made after the mother had died. The origin of the name 'caesarean' can probably be traced back to this birth.

AMAZING

Limeys

British sailors in those days were given lime juice daily, to prevent a disease called scurvy. Because of this tradition, they were nicknamed 'Limeys'.

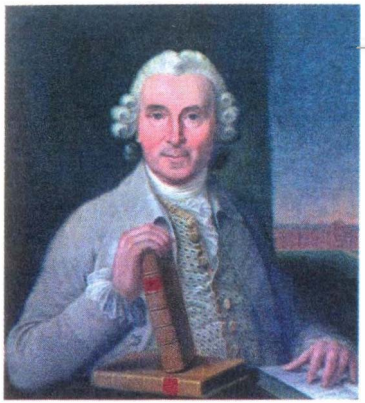
What is the medical importance of timing the pulse?

John Floyer was an English physician who is best known for inventing a device for timing the pulse. It was called the pulse watch, and it was a breakthrough in that till then, there was no accurate way to measure the pulse rate of a patient.

Measuring the pulse rate helps a doctor to arrive at a correct diagnosis, and Floyer's watch could be used to accurately count the pulse rate for sixty seconds.

This was because, for the first time, a watch had a second hand to tick off each moment. Floyer was also a prolific writer. His medical writings give abundant evidence both of his own insatiable curiosity, and of his passion for experiments. His most famous work is 'The Physician's Pulse Watch.' It has over a thousand pages of observations, commentaries, charts, and tables relating to the pulse!

Checking Pulse



James Lind

Why was it important to find a remedy for scurvy?

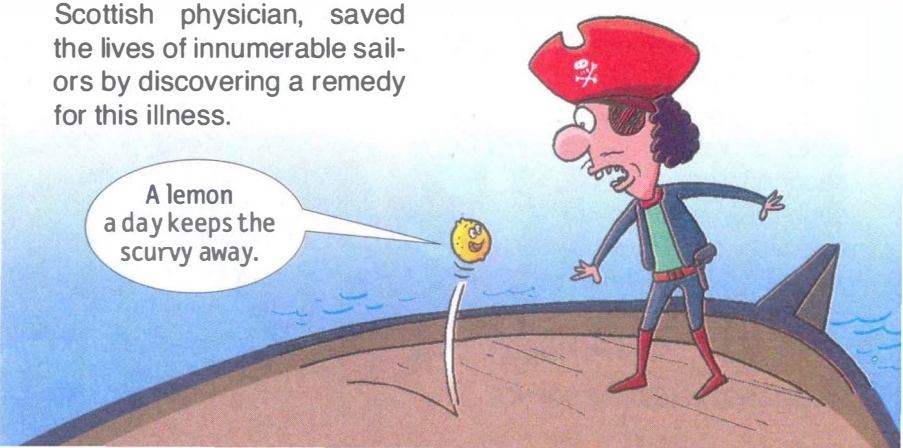
In the 18th century, sailors who spent months together at sea ate a diet of mainly dried meat and bread with no fresh fruit or vegetables.

Many of them were affected by a dreaded disease called scurvy. James Lind, a Scottish physician, saved the lives of innumerable sailors by discovering a remedy for this illness.

In 1747, while serving as surgeon on the HMS Salisbury, he carried out experiments to discover the cause of scurvy, the symptoms of which included loose teeth, bleeding gums, and haemorrhages. He discovered that sailors who were given citrus fruits daily did not get the disease.

As a result of this discovery, sailors were given lemon juice to drink every day, and scurvy disappeared almost completely from the ships of the Royal Navy.

Today, we know that scurvy is caused by a deficiency of Vitamin C. Since lemons are rich in Vitamin C, drinking lime juice daily is an excellent way to prevent this crippling, and sometimes fatal disease.



Why is pathology so important?

Doctors have always been concerned with the origin of diseases not just out of sheer curiosity, but in order to improve the effectiveness of the battle against them.

Pathology is the branch of medicine that studies the causes and effects of diseases. It deals with the laboratory examination of samples of body tissue and organs, to arrive at an accurate diagnosis.

The Italian anatomist Giovanni Battista Morgagni was the founder of the pathological anatomy. He was the first to demonstrate the necessity of diagnosis, prognosis, and treatment on a comprehensive knowledge of anatomical conditions.

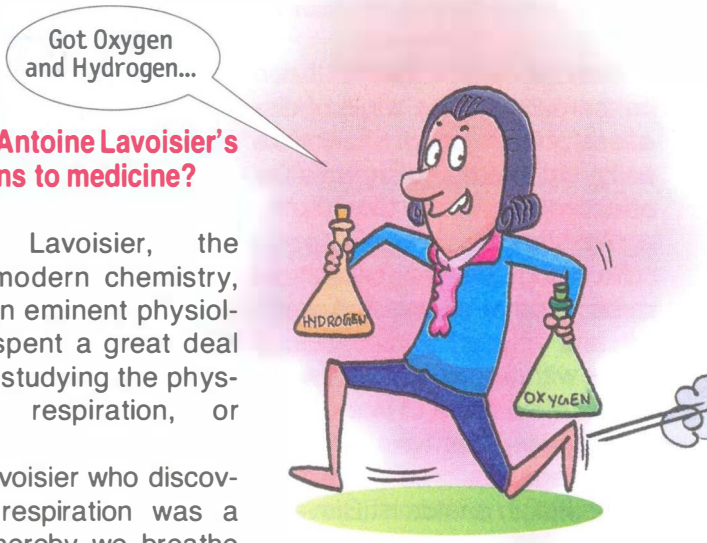
Giovanni Morgagni's work was based on years of careful observation and experiment, including over 600 post-mortem examinations.

His brilliant descriptions of pathological conditions make Morgagni the founder of pathological anatomy, both as a part of anatomical study, and as a basis for understanding the cause of illness.

Undeserved Death

Antoine Lavoisier, a French chemist, was the first person to understand the process of respiration. He was also a tax collector, and after the death of King Louis XVI, he was executed by the revolutionaries in 1794.

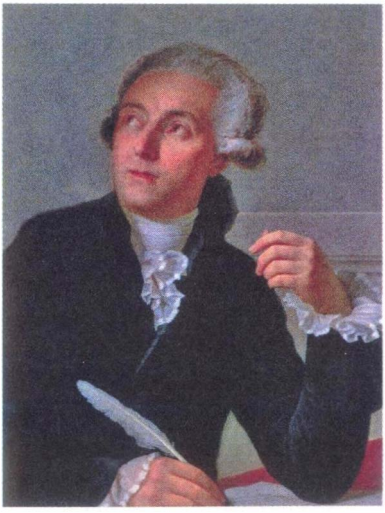
Giovanni Battista Morgagni



What were Antoine Lavoisier's contributions to medicine?

Antoine Lavoisier, the father of modern chemistry, was also an eminent physiologist. He spent a great deal of his time studying the physiology of respiration, or breathing.

It was Lavoisier who discovered that respiration was a process whereby we breathe in air, and the oxygen in the air is absorbed by blood in the lungs. He showed that oxygen was needed for respiration, and that carbon dioxide was produced as a result of it.



Antoine Lavoisier

Lavoisier used guinea pigs to determine the ratio between the amount of oxygen breathed in, and the amount of carbon dioxide and water that was breathed out.

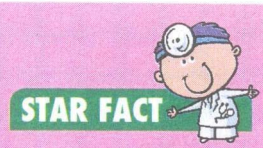
He used his findings to push for better public health in cities and towns. Did you know that it was Lavoisier who gave hydrogen and oxygen their names?

What was Edward Jenner's role in medical history?

Edward Jenner, an English doctor, was the pioneer of smallpox vaccination, and the father of immunology. He lived in an era when smallpox was a dreaded disease that killed the maximum number of children every year.

In 1796, Jenner carried an experiment on an eight-year-old boy, James Phipps. He had a theory that milkmaids who suffered the mild disease of cowpox never contracted smallpox.

Edward Jenner



Pharaoh's Killer

Smallpox was one of the greatest killers during ancient times. The Egyptian Pharaoh, Ramses V died of this disease, as studies of his mummified head prove.

To test this theory, Jenner took pus from a cowpox pustule, and inserted it into an incision on the boy's arm. Later, he proved that because of having been inoculated with cowpox, Phipps was immune to smallpox.

Jenner experimented on several other children, including his own 11-month-old son. In 1798, the results were published, and the smallpox vaccine had been discovered!

Smallpox became the first disease to be eradicated from the world by vaccination–thanks to Edward Jenner!

Rene Laennec

How did the invention of the stethoscope change medical history?

Today, we are all familiar with the stethoscope that doctors use to listen to the sounds made by our lungs and our hearts.

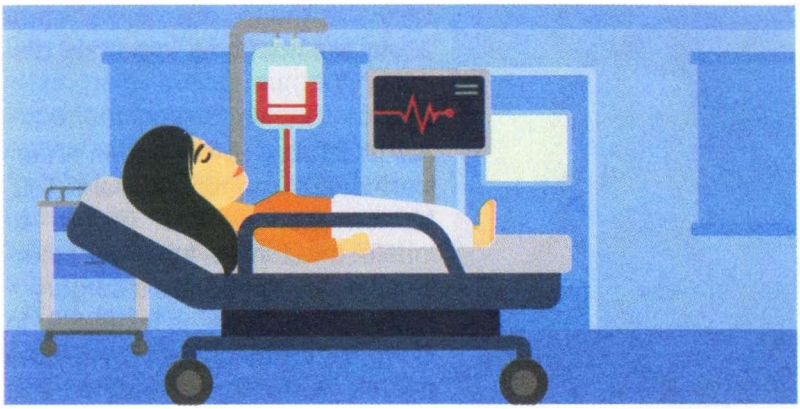
Did you know that the first stethoscope consisted of a wooden tube similar to an ear trumpet? It was invented by Rene Laennec, a French doctor in 1816.

Earlier, he had felt too embarrassed to put his ear to a woman's chest to listen to heart sounds. So, he used a rolled up piece of paper instead. He was excited to discover that the heart sounds were clearly audible, and this discovery later lead to the development of the stethoscope.

Today, stethoscopes are highly sophisticated and specialized instruments. Their invention has changed medical history, because the sounds made by the heart and the lungs are important clues in diagnosing an illness.

Why was the first blood transfusion a historic one?

In 1628, a British physician William Harvey described the circulation and properties of blood. The



first blood transfusions were also attempted around this time, although these were often unsuccessful, and proved fatal in humans.

The first successful blood transfusion recorded was performed by a British physician Richard Lower in 1665. It was performed on a dog. In 1667, Jean-Baptiste Denis who was physician to King Louis XIV, performed the transfusion of blood from an animal to a human.

Later, in 1818, a British obstetrician James Blundell successfully transfused human blood to a patient who had bled heavily during childbirth, and saved her life.

During the Second World War, blood transfusion was used on a large scale to treat injured soldiers. Today, blood transfusions are accepted as a life saving procedure. By donating blood, a healthy adult can help to save a life. Isn't that a wonderful thing to do?

Royal Physician

William Harvey was appointed as the 'Physician Extraordinary' to King James I on 3rd February, 1618. He also served as physician to various aristocrats like Lord Chancellor Bacon.

William Morton

Why was the introduction of ether as an anesthetic an important discovery?

On October 16th, 1846, an American dentist named William T.G. Morton instructed a patient to inhale the fumes from an ether-soaked sponge before a surgery.

The fumes put the patient to sleep. After the surgery, when the patient woke up, he reported that he had felt no pain whatsoever. Until then, surgery meant horrific pain, for patients were fully conscious during the procedure.

At the time of William Morton's demonstration, people had known about ether for more than 300 years. But for most of those 300 years, no one had thought to use it

CURIOUS FACT

I look Into...

A stethoscope is a medical instrument for listening to the sounds of someone's heart or breathing. The word stethoscope literarilly means 'look into the chest'.

as an anesthetic. The discovery that ether could be made to alleviate pain during surgery was important for two reasons. It obviously made surgery a more comfortable experience for patients, but it also allowed surgeons to take their time operating on anesthetized patients.

This, in turn, allowed doctors to develop more and more complex, and beneficial surgical techniques.

What is the significance of the invention of the ophthalmoscope?

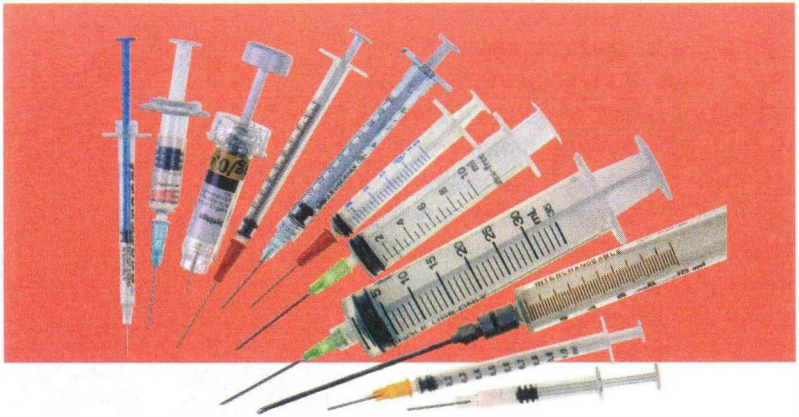
The ophthalmoscope is an instrument for looking inside the eye in living bodies. It helps the doctor to examine the inside of your eye, by looking through the pupil.

Before the ophthalmoscope, doctors used a magnifying glass to examine the eye. However, this did not allow them to see inside the eye. A German physicist and physiologist, Hermann Helmholtz, developed an instrument to enable physicians to examine the inside of your eye by looking through the pupil. This was the ophthalmoscope.

Hermann Helmholtz

It not only illuminated the retina, it enabled the doctor to observe it at the same time. This instrument allowed physicians to detect and investigate many complaints of the eye, such as glaucoma, tumours, and detached retinas.

It also helped them to detect diseases like high blood pressure and diabetes. In short, the ophthalmoscope improved both medical research on the eye and medical practice as a whole.



Who invented the hypodermic syringe?

A hypodermic syringe is a small glass piston or barrel syringe with a detachable, hollow needle that is used to give injections. It was in the 1850s that the French veterinary surgeon Charles Gabriel Pravaz and the Scottish doctor Alexander Wood developed this instrument.

It had a hollow needle fine enough to pierce the skin. The barrels were initially made of metal, but by 1866, they were made from glass to enable doctors to see how much of the medication remained in the barrel.

Hypodermic syringes may also be used to take liquid samples from the body, for example, to take blood samples from a vein for testing.

The hypodermic syringe is an important milestone because, before its invention, medicines could be introduced directly into the body only by making an incision or cutting opens the skin. The hypodermic

syringe made it possible to give an injection by just pricking the skin, to introduce the medicine directly into the bloodstream.

What is the role played by Claude Bernard in medical history?

Claude Bernard was a French physiologist. He is considered to be the 'father of modern experimental physiology.' Physiology is the biological study of the functions of living organisms and their parts.

Claude Bernard's first important works were carried out on the physiology of digestion. By dissecting animals, he discovered the way in which animals and humans digest their food. He was interested in the role of the pancreas exocrine gland, the gastric juices, and of the intestines.

In 1857, he established that pancreas was involved in digesting fat and the liver produced sugar. In addition to this, Bernard also made other important contributions to the neurosciences, such as the study of sensory nerves.

Widely credited as one of the founders of experimental medicine, Bernard played a vital role in laying down the basic rules of experimentation in the life sciences.

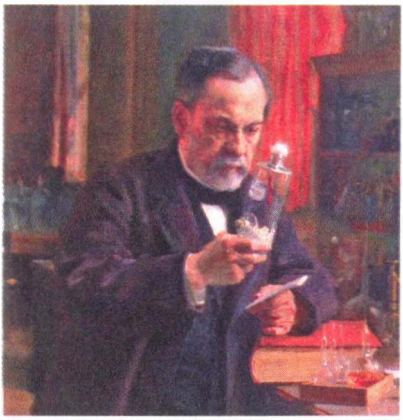
Claude Bernard

Vaccine for Measles

Measles is a very common childhood disease that can sometimes have severe side effects. In 1963, a vaccine for measles was developed. It has saved many lives.

How has Louis Pasteur changed medical history?

Louis Pasteur was an 18th century French chemist and microbiologist whose contributions to science, technology, and medicine are unparalleled. He is best known for two things: pasteurization and vaccination.



Louis Pasteur

Pasteur was able to demonstrate that microorganisms like bacteria are responsible for souring wine, beer, and milk. He also demonstrated these bacteria could have been removed by boiling, and then cooling the milk. This process is known as pasteurization.

Chicken Cholera

Chicken cholera is a serious, highly contagious disease caused by chickens, turkeys, and waterfowl. In 1879, Louis Pasteur discovered a vaccine for it.

During his lifetime, Pasteur worked with diseases such as cholera in chickens, and developed a vaccine for it. It was also Pasteur who produced and tested the first rabies vaccine.

On July 6th, 1885, a nine-year-old boy named Joseph

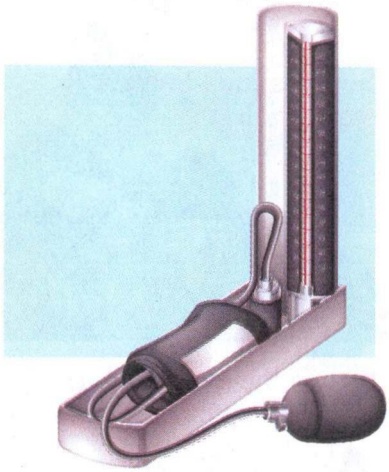
Meister was attacked by a rabid dog. The young boy faced almost certain death, but was saved by Pasteur's vaccine. Louis Pasteur would also be responsible for creating the earliest vaccines against anthrax.

What is a sphygmomanometer?

Hypertension, or high blood pressure, is a growing problem with significant health risks. Therefore, one of the first things a doctor does when examining a patient is to check his or her blood pressure.

This is done using an instrument called the Sphygmomanometer, also called a blood pressure meter or sphygmometer.

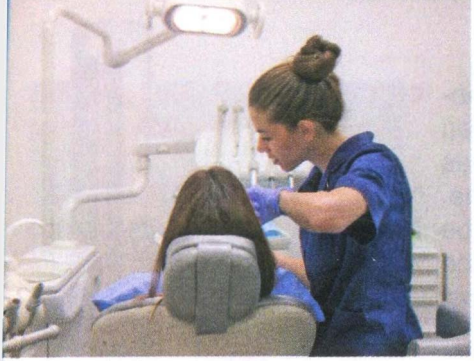
The earliest form of this instrument was developed in 1835 by Jules Harrison. It was not very efficient though. An improved version was introduced in 1860 by Etienne Jules Marey. He invented a machine that not only transferred the beat of the pulse to a column of mercury but magnified the movement as well.



Sphygmomanometer

The machine commonly in use today, is much more accurate. It was invented in 1896 by the Italian scientist Scipione Riva-Rocci. This instrument has an armband which can be inflated with air to cut off the blood supply. The doctor listens to the pulse beat through a stethoscope, and reads the pressure on a dial.

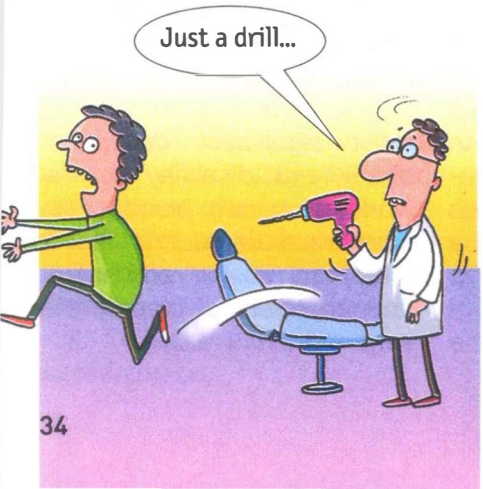
High blood pressure is the most significant cause of death and disability in the world. Accurate blood pressure measurement is therefore, vital in the prevention and treatment of blood-pressure–related diseases.



Why is the motorized dental drill a milestone in medical history?

Are you afraid of going to the dentist? You shouldn't be, because nowadays, getting a tooth fixed is quite a painless procedure.

The dentist uses a dental drill. This instrument bores through tooth enamel and is also used to clean and remove plaque from the tooth's surface. Earlier, dental drills were cranked by hand or by a foot pedal.



STAR FACT

Antiseptic

Antiseptics are used to prevent open wounds from getting infected. The word 'sepsis' means putrefaction or 'becoming rotten' in Greek. So antiseptic means 'against putrefaction'.

However, this made the procedure a slow and laborious one.

In 1864, George Harrington invented a drill that used a clockwork mechanism- an incredibly noisy device. But it was Dr. Greene, an American dentist, who invented the first electric drill in 1875, turning the practice of dentistry on its head.

Today's dental drills are sophisticated instruments, designed for precision, power, and efficiency. They make dental procedures more pleasant and effective for dentists and patients alike.

What was the contribution of Joseph Lister to surgery?

Joseph Lister was a British surgeon who pioneered the use of antiseptics in surgery. He was aware that the number of deaths after surgery was not caused by the operation itself, but by infection after the procedure.

He looked for a solution to find a way to kill the germs before they got a chance to enter the wound, so as to prevent the infection in the first place. Carbolic acid was then being used as an effective disinfectant for sewers. Lister started using it to wash his hands, and the instruments he needed in every operation.

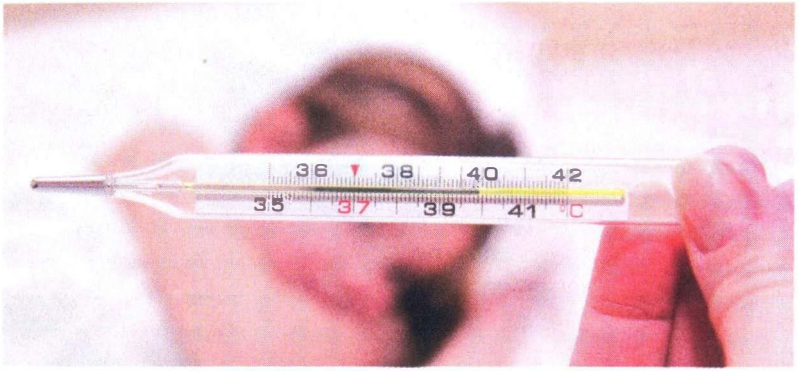
He started covering his patients' wounds with a piece of lint dipped in carbolic acid, and also devised a machine that sprayed the air with carbolic acid to get rid of airborne germs.

By introducing the idea of using an antiseptic to prevent infection, Joseph Lister's contributions paved the way to safer medical procedures. No wonder he is often called the 'father of modern surgery'!

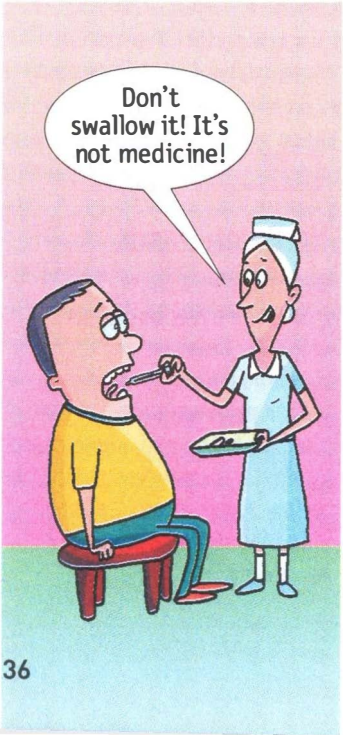
Joseph Lister

No Clean Hands

Before Lister's time, a surgeon never bothered to wash his hands before touching a patient, or even before performing an operation. The only precaution against infection was a daily airing of wards, as infection was thought to be caused by 'bad air'.



Clinical Thermometer



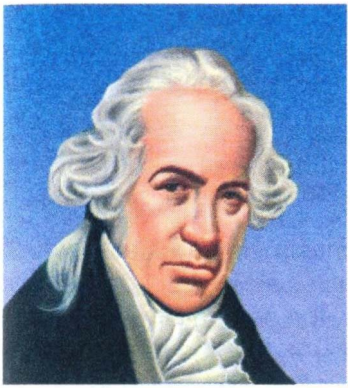
What is the importance of the thermometer in medicine?

In the earliest days of the medical profession, no device existed to measure a patient's body temperature. Evaluating a patients' body temperature depended totally on the doctor's personal methods of observation.

The invention of the thermometer changed all that. The thermometer is an instrument used to measure temperature. There are different types of thermometers that are used for different purposes.

A medical thermometer is one that is used to measure the temperature of human bodies. The first thermometer was invented by Galileo in the 16th century.

However, it was only a hundred



Daniel Fahrenheit

years later, that a thermometer which could easily be used by doctors, was introduced by Daniel Fahrenheit.

Robert Koch

He invented an alcohol thermometer in 1709, and the mercury thermometer in 1714. As time progressed, thermometers became smaller, faster, and more easy to use. New thermometers are being designed that can read a patient's temperature using infrared technology, for a fast and accurate reading.

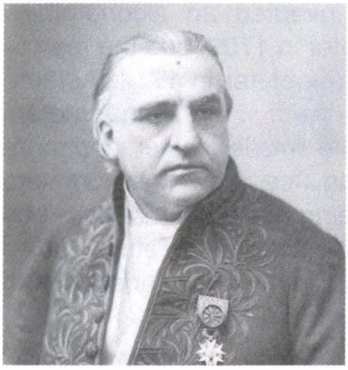
Why is Robert Koch a colossus in medical history?

Robert Koch, German physician, is widely credited as the founder of bacteriology and microbiology.

One of his greatest contributions to medicine is that he identified the cause of tuberculosis as the bacteria mycobacterium tuberculosis.

At that time, tuberculosis was a killer disease that was believed to be hereditary. Koch's discovery would be the first crucial step in the treatment of the disease, and he won the Nobel Prize for this achievement. His studies showed how anthrax is transmitted between cows and humans.

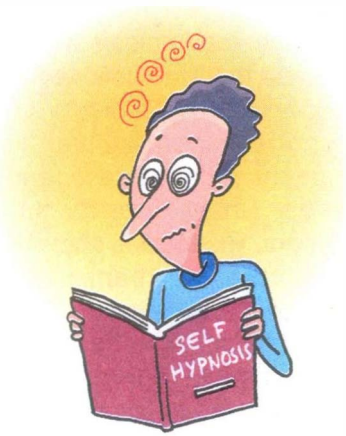
Robert Koch made many contributions to the field of microbiology. He was able to develop



Jean Martin Charcot

specific ways to kill bacteria, as well as ways to observe bacteria in the Petri dish.

Finally, Robert Koch made it easier to see bacteria under a microscope, by staining it. Thus, Robert Koch's work made significant advances in the treatment of diseases.



How has the introduction of hypnosis changed psychiatry?

Hypnosis is a state which resembles sleep, but is not sleep; in fact, the person is wide awake, but his or her thoughts can be easily influenced by suggestions made by another person, usually a trained professional.

In other words, hypnosis is a state of highly focused attention or concentration, often associated with relaxation, and heightened suggestibility. Hypnosis as a treatment method was first used by the famous physician Jean Martin Charcot.

Charcot took an interest in a condition then called hysteria. To study the patients under his care, he learned the technique of hypnosis, and soon became a master in this field.

He hypnotized his patients in order to induce, and study their symptoms. Charcot identified neurological disorders with such precision that many of his diagnoses are still recognized by physicians. Modern psychia-

Vaccine for TB

The vaccine to prevent tuberculosis was developed by two French bacteriologists, Albert Calmette and Camille Guerin, in 1921. The vaccine is called the BCG in their honour. BCG stands for Bacille Calmette-Guerin.

trists undoubtedly owe him a deep debt of gratitude for introducing hypnosis as a tool for treatment.

What is the significance of Von Behring's discoveries?

Diphtheria is a highly contagious disease that is spread by direct physical contact, or by breathing in the secretions of those infected. It was once considered to be fatal, especially among children, but Emil von Behring's discovery of an antitoxin proved to be a turning point in its treatment.

Tetanus was another leading cause of death in those times - especially during wars. It was Von Behring who developed a serum that proved invaluable in preventing tetanus. Behring's career began in the early 1890s, when he became an assistant at the Institute for Infectious Diseases, headed by Robert Koch. He started his studies with experiments on the development of a therapeutic serum.

In 1890, together with his university friend Erich Wernicke, he had managed to

Emil von Behring

Wilhelm Rontgen

develop the first effective therapeutic serum against diphtheria. At the same time, together with Shibasaburo Kitasato he developed an effective therapeutic serum against tetanus. Behring lived entirely for his idea of revolutionizing medicine through serum therapy. In 1901, Behring received the Nobel Prize in Physiology or Medicine.

What was the impact of the discovery of X-Rays?

In 1895, physicist Wilhelm Conrad Rontgen became the first person to observe X-rays. Rontgen's discovery occurred accidentally in Germany. He was working in his lab, testing whether cathode rays could pass through glass, when he noticed a glow coming from a nearby chemically coated screen.

He dubbed the rays that caused this glow X-rays because of their unknown nature. X-rays are electromagnetic energy waves that act similarly to light rays, but at wavelengths approximately 1,000 times shorter than those of light. This enables these rays to pass through solid objects.

Rontgen's discovery was a medical miracle because X-Rays allowed doctors to see inside the

human body for the first time, without surgery.

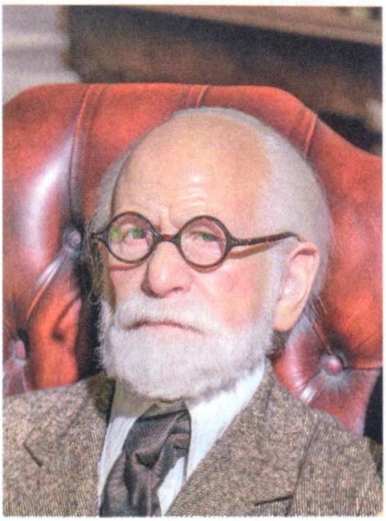
Today, X-ray technology is widely used in medicine, material analysis, and devices such as airport security scanners.

Why is Sigmund Freud a legendary figure in psychoanalysis?

Sigmund Freud is famous as the father of psychoanalysis. All of his work revolved around the human mind. He studied how the mind worked, and how to diagnose, and treat certain maladies of the mind.

Freud was the first to use the term psychoanalysis in 1896. He believed that the purpose of psychoanalysis was to explore the inner self, and that dreams are significant, as they often reveal something that is hidden in our mind.

Psychoanalysis is often known as the talking cure. Typically, Freud would encourage his patients to talk freely regarding their symptoms, and to describe exactly what was on their mind. He believed that this helped people to discover themselves.

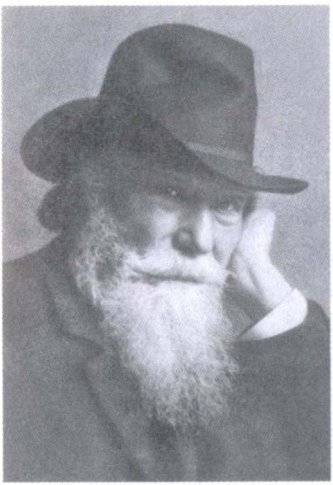


Sigmund Freud

He became so famous that words he introduced through his theories, are now used every day by even ordinary people!

STAR FACT

'The Interpretation of Dreams' was a book published by Sigmund Freud in 1899. It proved to be a milestone in treating problems of the mind.



Karl Joseph Eberth

What was the significance of the discovery of a vaccine for typhoid?

Typhoid is a type of fever that has been responsible for many deaths during the course of history. William Budd was an English doctor responsible for treating an outbreak of typhoid in 1838, when he noted that the poison, as he then called it, was present in the excretions of the infected. He realized that it could be transmitted to healthy people if they drank water that was contaminated by these excretions.

Karl Joseph Eberth was the first to describe the bacillus that was suspected to cause typhoid in 1880. Four years later, Georg Gaffky, a pathologist, confirmed this link, and named the bacillus Eberthella typhi.

The first effective vaccine for typhoid was developed by Almroth Edward Wright, and was introduced for military use in 1896. His vaccine was further developed over the following years in London. Throughout the 20th century, the incidence of typhoid fever steadily declined, which was due to the introduction of vaccinations, and improvements in public sanitation and hygiene.

Why is Paul Ehrlich one of the luminaries in medical history?

Paul Ehrlich, a German Jewish medical scientist, was a pioneer in the fields of chemotherapy, haematology, and immunology.

During his time, French chemist Louis Pasteur and German bacteriologist Robert Koch were each discovering the role bacteria played in disease. However, Ehrlich was the first to think of chemistry in relation to medicine.

Paul Ehrlich

Early in his career, Ehrlich became interested in tissue staining, and his various inventions and discoveries stemmed from his preliminary research. His tissue staining experiments also helped Ehrlich to develop a test that detected a substance called bilirubin in urine, which helped doctors to diagnose patients with jaundice, a disorder of the liver.

Ehrlich is credited with discovering chemotherapy as a treatment for cancer. This discovery came about as Ehrlich researched ways to create drugs that would only target a specific condition. But perhaps Ehrlich is most renowned for developing an antibiotic that could treat, and cure syphilis. In fact, many of his discoveries paved the way for 21st century medical methods.

Cell Eaters

Elie Metchnikoff is sometimes credited as the father of natural immunity. He was the first to identify phagocyte, a type of cell within the body that is capable of absorbing bacteria.

A Lonely Man

Though Aspirin became world famous, its inventor was a lonely man. Hoffmann lived in Switzerland, out of the public eye, until his death in 1946. He never married, and had no children.

Felix Hofmann

What is the role played by aspirin in medical history?

If you have a headache, your mother will probably give you an aspirin to relieve the pain. Aspirin is actually made from a natural substance called salicylic acid, which is found in many plants which has been used to relieve pain for centuries.

The beginning of aspirin as we know it can be traced to Friedrich Bayer and Company. Just as the medical uses of salicylic acid were known, it was also known that it caused many stomach problems.

Arthur Eichengrun, the head of chemical research at Bayer, assigned the task of developing a 'better' salicylic acid to one of the company's chemists, Felix Hoffmann. It was Hoffman who developed the modern synthetic aspirin that is so widely used today.

Aspirin is also an ingredient in many cold and flu preparations. Doctors often prescribe it as a valuable medicine to prevent heart attacks, and it is under investigation in treating a number of other medical conditions such as cancer and diabetes.

Why was the discovery of blood groups significant?

For a long time, doctors had noticed that about half the patients who received blood transfusions developed severe reactions that proved fatal.

It was not until 1901, when the Austrian Karl Landsteiner discovered human blood groups, that blood transfusions became safer. It was found that the mixing of blood from two individuals during a transfusion, can lead to blood clumping.

Karl Landsteiner

The clumped red cells can crack, and cause toxic reactions. This can cause the death of a patient. Karl Landsteiner discovered that blood clumping was a reaction which occurs when the receiver of a blood transfusion has antibodies against the donor blood cells. He also discovered that there were three human blood groups.

These were A, B, and O blood groups. To avoid such reaction, transfusions should take place only between people of the same blood group.

Nobel Laureate Karl Landsteiner was involved in the discovery of both the A,B and O blood groups in 1901, and the AB group later on.

Why is the ECG machine an important invention?

Until the late 1800s, medical scientists could only record heart activity by directly examining the

Willem Einthoven

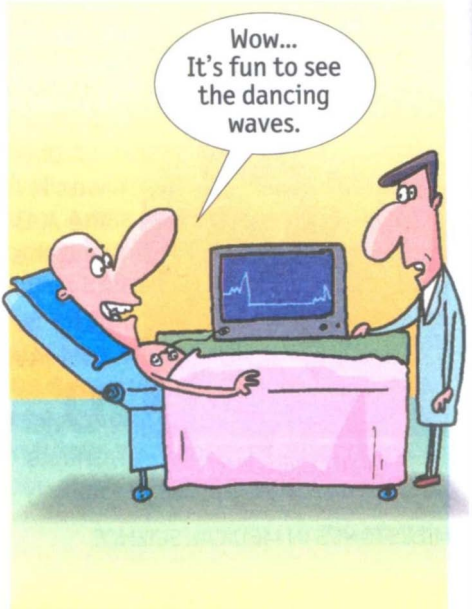
Small and Portable

It was Taro Takemi who took the ECG machine to the next level in 1937. He invented a small and portable machine, which was convenient to use.

heart, which was not possible on a living patient.

In 1903, a Dutch doctor, Willem Einthoven invented the ECG machine. This instrument made it possible to record the heart's electrical activity by placing electrodes on the skin. The machine then gives a recording of the small electric waves being generated during heart activity.

In 1924, Einthoven was awarded the Nobel Prize in Medicine for his discovery. However, early ECG machines were cumbersome, and hard to use. Many improvements have been made, and today's machines are compact, highly sophisticated and extremely accurate. They are used worldwide as a relatively simple way of diagnosing heart conditions.



How did radiation therapy bring about a revolution in the treatment of cancer?

Cancer is a disease that causes normal cells in the body to grow out of control. If left untreated, these cells can spread throughout the body, and cause death.

In fact, in the 19th century, cancer was thought to be incurable. The beginning of the 20th century saw the introduction of radiation therapy as a method for treating, and curing cancer. It was in 1902 that a German surgeon called Georg Perthes, started using X-rays to shrink the cancerous growths.

However, in those days, radium was for radiation therapy and exposure to radium can be dangerous. Today, a much safer form of radiation therapy uses Cobalt 60 as a source of gamma rays to kill the cancer cells and keep them from growing and multiplying.

Some people may first have surgery to remove cancer cells or tumours and then have radiation therapy. Or, sometimes a dose of radiation is given during the surgery. Each person's treatment depends on the kind of cancer he or she has.

Georg Perthes

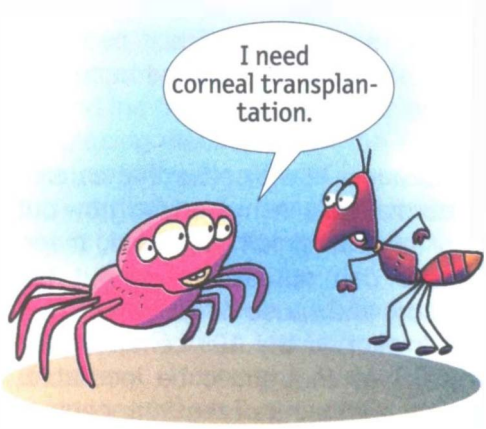
My name is ...

The word 'vitamin' was first used by a Polish chemist named Casimir Funk. He used it as a shortening for vital amine. Funk wrongly thought that all the vitamins were compounds of ammonia.

Success Rate

Though a corneal transplant is a delicate, and highly skilled procedure, technological advances have made it extremely safe, and the success rate is more than 95 per cent. Millions of people have thus been saved from blindness thanks to this procedure.

Eduard Zirm



Why was the first corneal transplantation a milestone in medical history?

The cornea, which has five distinct layers, is the transparent outer coating of the eye. In the past, damage to the cornea was a common cause of blindness.

A corneal transplantation is an operation done on the eye, to replace a damaged cornea, with a healthy one that has been donated by someone.

The first attempts to perform corneal transplantation—all unsuccessful—date from the nineteenth century. Success finally came in 1905 when a Moravian doctor, Eduard Zirm transplanted a child donor's cornea to the eye of a chemical burn victim.

Corneal transplantation has saved many people from blindness. Today, it is performed using lasers and is a safe, and most effective way to prevent and treat blindness.

What is laparoscopic surgery?

In traditional surgery, the surgeon makes a large incision so that he can perform the operation. Laparoscopic surgery is a modern surgical technique in which operations are performed through small incisions, or keyholes.

It was in 1902 that Georg Kelling from Dresden in Germany performed laparoscopic surgery using dogs. In 1910, Hans Christian Jacobaeus from Sweden used the approach to operate on a human. Since then, many advances have been made in this procedure.

The introduction of the computer chip television camera was a key event in the development of laparoscopy. It allowed the doctor to do the surgery while viewing a projected image on a screen.

Laparoscopic surgery has several advantages over traditional surgery, as it leaves only a tiny scar. Moreover, there is less loss of blood, less risk of infection, and less pain after surgery. Best of all, the patient can go home in a day or two, and resume normal activities faster.

Hans Christian Jacobaeus

Slow Realisation

It took long time for people to realise the side effects of X-rays. In the 1950s, it was a common practice among doctors to X-ray pregnant women to know the development of their unborn child.

Sidney Farber

Sticking Plaster

Adhesive bandages are generally known by the name Band-Aid, but it is only a tradename used by the company Johnson and Johnson. Adhesive bandages are otherwise known as sticking plasters, or simply, plasters.

Why is chemotherapy treatment a boon for cancer patients?

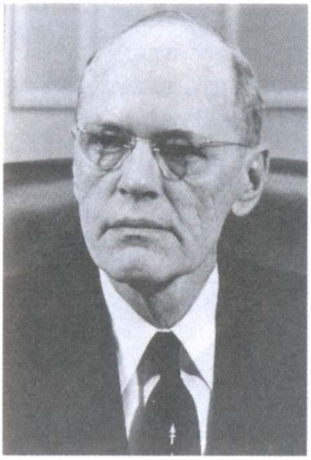
Chemotherapy is a type of treatment that includes a drug, or combination of drugs, to treat cancer. The goal of chemotherapy is to stop, or slow the growth of cancer cells.

During World War II, naval personnel who were exposed to mustard gas during military action were found to have changes in the bone marrow cells that develop into blood cells. This finding led researchers to investigate whether mustard agents could be used to halt the growth of rapidly dividing cells, such as cancer cells.

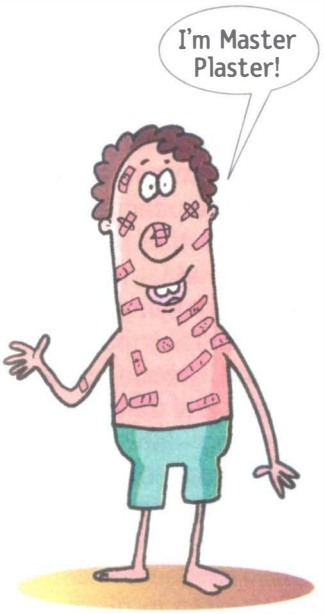
Even though Paul Ehrlich was the first person to try chemotherapy in treating cancer, it is Sidney Farber who is popularly known as the father of modern chemotherapy.

Research in this field eventually resulted in the introduction of many drugs known as chemotherapy drugs that target cancer cells, and destroy them. These drugs are given in different combinations and different strengths, depending upon the type of cancer.

Chemotherapy has proved to be a boon to cancer patients as it slows down the progression of disease.



Earle Dickson



How have adhesive bandages revolutionized the treatment of wounds?

If you cut yourself, you will find it difficult to bandage the wound without having someone to help you. This is not always possible, as a young housewife named Josephine Dickson found out in 1920. She was frequently cutting herself when cooking, and her husband Earle was not always at hand to help her with a bandage.

Finally, Earle hit upon an idea. He sat down and prepared some ready-made bandages by placing squares of cotton gauze at intervals along an adhesive strip, and covering them with crinoline. Now, all Josephine had to do was cut off a length of the strip, and wrap it over her cut.

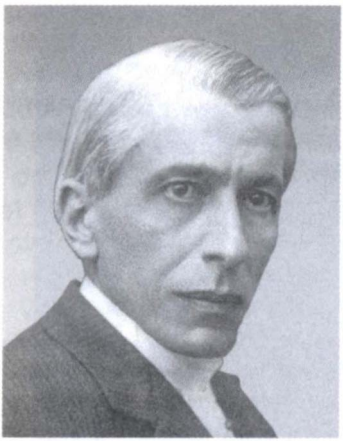
Earle, who was working at Johnson and Johnson, told his boss about this idea. The company went on to improve and market this adhesive bandages. Though the first adhesive bandages were handmade, soon they were being manufactured and sterilized by machines. Adhesive bandages are today a staple in every family's first-aid kit, and over 100 billion are sold worldwide.

In 1963, adhesive bandages went into space for the first time with astronauts.

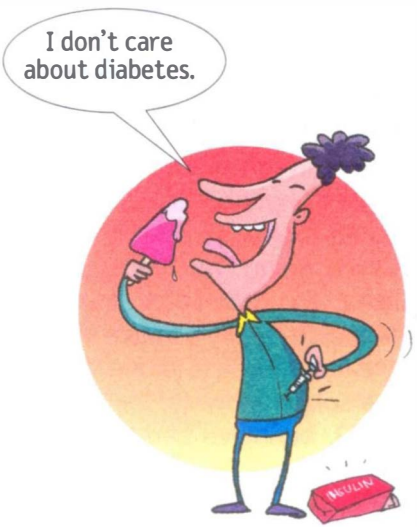
Why has insulin changed the way diabetes is treated?

Insulin is a hormone made in the pancreas, an organ located behind the stomach. Insulin plays a major role in metabolism—the way the body uses digested food for energy. Without enough insulin, excess glucose builds up in the bloodstream, leading to diabetes, and other serious health disorders.

The discovery and development of insulin as a medical treatment for diabetes can be traced to 1916, when Romanian Professor, Nicolae Paulescu, developed an extract of the pancreas, and showed that it lowers blood sugar in diabetic dogs.



Nicolae Paulescu



In 1921, in Toronto, Dr Frederick Banting and medical student Charles Best performed experiments on the pancreas of a dog. When the pancreas was removed, the dog showed the symptoms of diabetes. The pancreas was sliced, ground up, and injected a few times a day into the dog – and the dog regained its health. Later, an extract was made from the pancreas of cows, and purified for use on testing on humans.

Research into the development of insulin has driven scientists to take significant steps towards understanding human biology, and allowing diabetic people to lead longer, and more normal lives. A number of Nobel Prizes have been awarded for research into the hormone.

Who invented the EEG?

EEG stands for electroencephalogram. This is a test used to detect abnormalities related to electrical activity of the brain. Small metal discs with thin wires known as electrodes are placed on the scalp. They send signals to a computer to record the results.

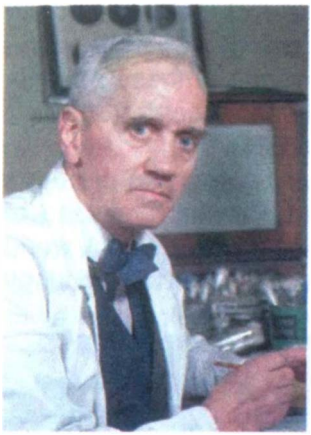
An EEG can determine changes in brain activity that may be useful in diagnosing brain disorders, especially epilepsy. Hans Berger was a German psychiatrist who developed the first human EEG in 1924.

Berger began by experimenting with dogs. He moved on to humans and started placing needle electrodes under the scalp of patients who had lost some of their skull bones in surgery. It was while working with one of these patients that Berger recorded the first human EEG.

The initial reaction of others to Berger's work was one of disbelief. The scientific world doubted whether the workings

Hans Berger

of an organ as complex as the brain could be recorded through the skull. Today, EEGs are widely used and Berger is credited with founding an entirely new, and very important branch of medical science, named clinical neurophysiology.



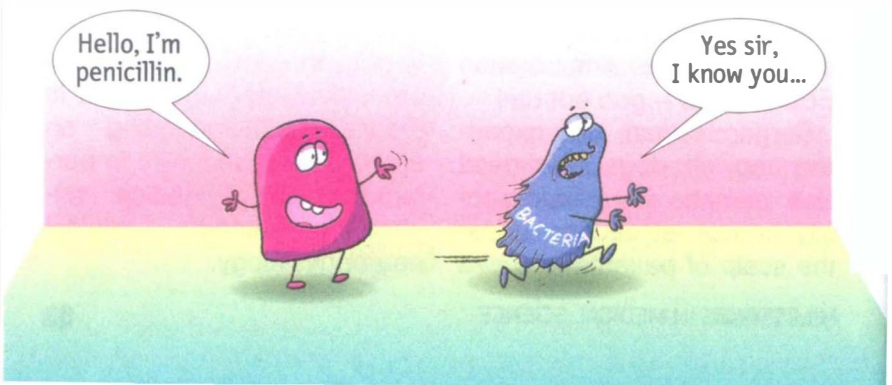
Alexander Fleming

What was the impact of the discovery of penicillin?

Penicillin, a wonder drug that has saved millions of lives, was actually discovered by mistake by a Scottish bacteriologist named Alexander Fleming in 1928. He was growing some bacteria in a Petri dish, and when he went on a vacation, he forgot to cover the dish.

On his return, he found that the green mould Pennicillium notatum had formed on the dish. He also noticed that the bacteria near the mould had all been killed. So, he isolated the mould, grew more of it, and then experimented to see how many other bacteria it could kill. It turned out that this mould could destroy many types of bacteria.

We now know that penicillin works by preventing bacteria from forming new cell walls. No new walls, no new cells, no new bacterial growth. After much research and experimentation, a mass-produced form of penicillin that could be injected was ready by 1942- just in time to help soldiers wounded in World War II. Fleming's discovery of penicillin has saved millions of lives, for penicillin is the cure for many serious infections.



How have blood banks saved countless lives?

British obstetrician and physiologist James Blundell performed the first recorded human-to-human blood transfusion. He injected a patient suffering from internal bleeding with 340 to 396 grammes of blood from several donors.

For many years, blood transfusion could be given only directly from a donor to a receiver. This was because if blood is stored, it starts to clot. In 1914, researchers discovered that adding sodium citrate to blood will prevent it from clotting, and refrigerating the blood made it possible to store it for days.

Today, if blood is needed urgently for a blood transfusion, one can always get it from a blood bank. These blood banks collect blood from donors, then store, and preserve it for later use.

Oswald Hope Robertson, a medical researcher was instrumental in establishing the first blood banks. Interestingly, it was Dr. Bernard Fantus at Chicago's Cook County Hospital who coined the term 'blood bank' in 1937. Blood banks play a crucial role in society for they save countless lives by making donated blood available to anyone in need of it.

James Blundell

STAR FACT

Donor

Donating blood can save a life. Did you know that the world's first blood donor service was established in 1921? It was the Secretary of the British Red Cross, Percy Oliver, who initiated this noble service.

What is the medical ultrasound?

The medical ultrasound, also known as sonography, is an imaging method that uses high-frequency sound waves to produce imag-

Karl Dussik

es of structures within your body.

The images can provide valuable information for diagnosing and treating a variety of diseases and conditions. The use of ultrasound in medicine began during and shortly after World War II, in various centres around the world.

The work of Dr. Karl Theodore Dussik in Austria in 1942 provided the first published work on medical ultrasonics. Rapid technological advances in electronics provided further improvements. The diagnostic applications of ultrasound were pioneered by Ian Donald.

The initial ultrasound machines produced by the medical device industry about half a century ago were large and cumbersome, with limited features. With the passage of time, more sophisticated ultrasound machines were developed. Today, the ultrasound plays a key role in monitoring the heart and the progress of a pregnancy, as well as in detecting abnormalities in other organs of the body.

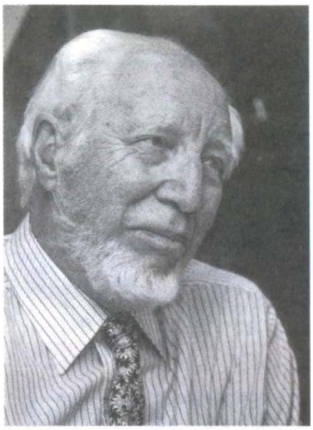
Why is dialysis a life saving procedure?

Dialysis is the artificial process of eliminating waste and unwanted water from the blood. Our kidneys do this naturally.

Some people, however, may have failed or damaged kidneys which cannot carry out the function properly - they may need dialysis. Dr. Willem Kolff is considered the father of dialysis. This Dutch physician constructed the first machine for dialysis. He was working in a small ward at the University of Groningen Hospital in the Netherlands, where he watched helplessly as a young man died slowly of kidney failure. Kolff decided to find a way to make a machine that would do the work of the kidneys.

When World War II broke out, Kolff continued his experiments, despite several hurdles, and the most challenging conditions. But his efforts bore fruit, and he finally succeeded in making such a machine. Kolff's machine is considered the first modern drum dialyzer, and it remained the standard for the next decade.

Since then, many improvements have been made, and giant strides have been taken in the treatment of kidney failure.



Willem Kolff

STAR FACT

Hope for Hips

In 1891, a German surgeon Themistocles Gluck tried to use ivory implants to replace a damaged hip. In 1940, an American surgeon, Dr Austin Moore performed the first metallic hip replacement at Columbia Hospital in South Carolina.

CURIOUS FACT

Pacemakers

A pacemaker is a small device that is placed in the chest to help control abnormal heart rhythms. John Hopps, an electrical engineer, was the first to design one.

Why are tranquillizers considered to be wonder drugs?

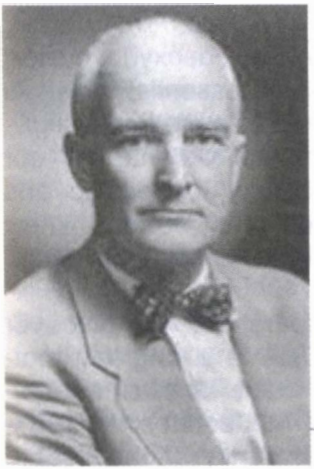
Tranquillizers are drugs that are prescribed by a doctor to relieve tension and anxiety. Dr. John Cade, an Australian psychiatrist, is credited with being the first to use a tranquillizer to calm a patient suffering from a mental illness. The major tranquillizers were first developed in the very early 1950s.

Tranquillizers are not a cure, but are given by doctors to relieve symptoms that are associated with other problems. These drugs calm agitated, excited, and irrational patients. They have enabled many seriously ill people who would otherwise be hospitalized, to live at home, and engage in productive work.

Tranquillizers are also found to be to be beneficial during surgery by reducing the amount of anesthetic needed. Before the advent of

John Cade

tranquillizers, the treatment of mental illness was often cruel and drastic, and many of the procedures only succeeded in making patients unfit for a normal life. In this respect, tranquillizers are indeed wonder drugs.



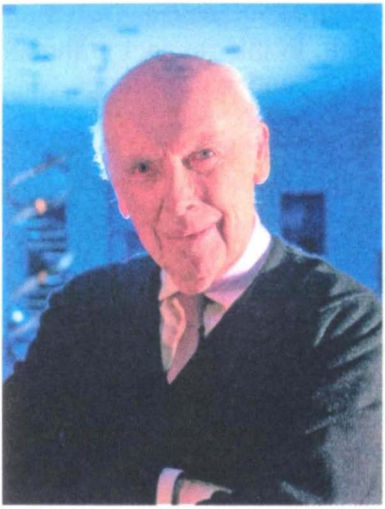
John H. Gibbon

Why is the first open heart surgery a milestone in medical science?

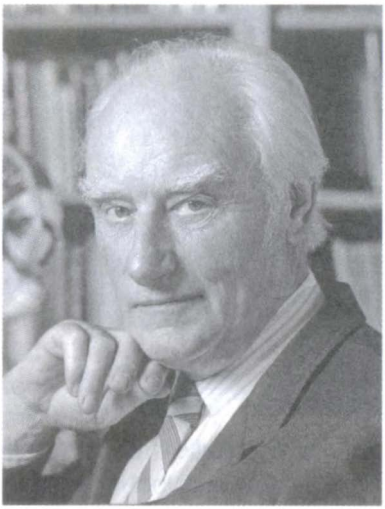
Heart surgery is done to correct problems with the heart. Open heart surgery is any type of surgery where the chest is cut open, and surgery is performed on the muscles, valves, or arteries of the heart. It was John H. Gibbon, of the Jefferson University Medical Centre, US who performed the first successful open-heart operation, with the help of a heart-lung machine.

He had studied and worked tirelessly on this project for 23 years to develop a machine that could interrupt the circulation by taking over the functions of the heart and lungs, allowing surgeons to operate on the heart.

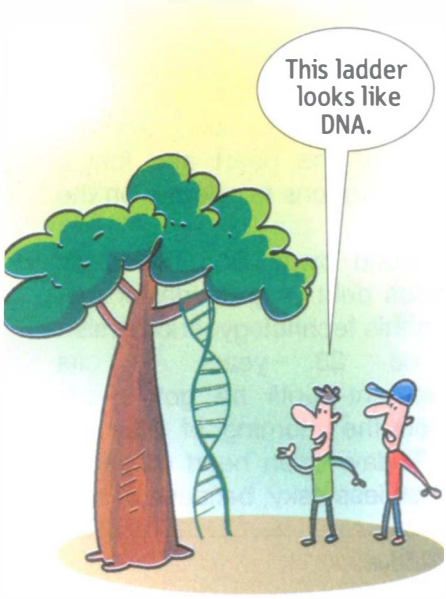
The world owes Dr. Gibbon an enormous debt of gratitude for pioneering this technology, and persisting for 23 years in its development—until he got it just right, on the morning of May 6th, 1953. Today, open heart surgeries are much less risky, because of him.



James Watson



Francis Crick



How did the double helix model of DNA change medical history?

DNA or deoxyribonucleic acid is an essential molecule for life. It acts like a recipe giving instructions that tell our bodies how to develop and function. But no one knew exactly its code or its structure.

Researchers did discover that DNA is a long thin molecule made up of something called nucleotides. In 1953, the discovery of the double

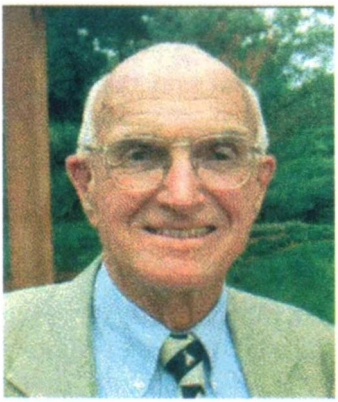
helix, or the twisted-ladder structure of DNA by James Watson and Francis Crick marked a milestone in the history of science. It was the start of a new era in biology, leading, over the next two decades, to the cracking of the genetic code and the realization that DNA directs the synthesis of proteins.

There were technical advances too, such as DNA sequencing, genetic engineering, and gene cloning. The double helix in short, reshaped biology and the practical benefits of Crick and Watson's discovery for humanity - in industry, medicine, food and agriculture.- are mind boggling.

How have kidney transplants brought new hope to patients with diseases of the kidneys?

We have seen how the introduction of dialysis was an important step in the treatment of kidney diseases. The next step in bringing hope to those suffering diseases of the kidney was kidney transplantation.

A kidney transplant is an operation done to place a healthy kidney from a live or deceased donor, into a person whose kidneys no longer function properly. In 1902, the first kidney transplants were performed at the Vienna Medical School in Austria, in animals. Seven years later, the first kidney transplant experiments were performed in humans in France using animal kidneys.



Joseph E. Murray

The first human-to-human kidney transplant was performed in 1933, but it was not successful. In 1954, Joseph E. Murray and his colleagues at Peter Bent Brigham Hospital in Boston performed the first truly successful kidney transplant from one twin to

another. Since then, important advances have been made in this field, and initial setbacks have been overcome.

What is a heart-lung machine?

A machine that temporarily takes over the functions of the heart and lungs; especially during heart surgery, is known as a heart-lung machine. It takes over for the heart by replacing the heart's pumping action, and by adding oxygen to the blood. This means that the heart will not move during the operation, which is necessary when the heart has to be opened up to correct a defect.

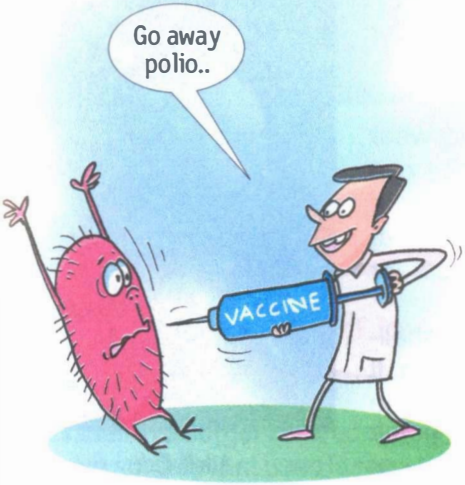
The heart-lung machine is connected to the patient by a series of tubes that the surgical team places. At the end of the operation, the surgeon gradually allows the patient's heart to resume its normal function, and he or she is slowly taken off the heart-lung machine.

The heart-lung machine was invented in 1953 by Dr. John Gibbon. Without this invention, it would not have been possible to perform the heart operations that save millions of lives today.

A heart-lung machine of 1955

What has been the impact of the introduction of the polio vaccine?

Polio is a dreaded disease that causes paralysis and cripples a person. In the past, millions of children



were affected by it. Few diseases frightened parents more in the early part of the 20th century than did polio.

There is still no cure for the disease, but Dr. Jonas Salk found a way to prevent it by discovering a vaccine for it in 1953. Salk administered the vaccine to volunteers who had not had polio. They included himself, his lab scientist, his wife and their children. All developed resistance against polio.

Further improvements were made to the vaccine to make it more effective, and it was Albert Sabin who first developed the oral polio vaccines.

STAR FACT

All together

The worldwide move to eradicate polio is a triumph of co-operation between governments and private organisations for the greater good. Organisations like Rotary International and WHO have joined hands to make our planet polio-free.

Jonas Salk

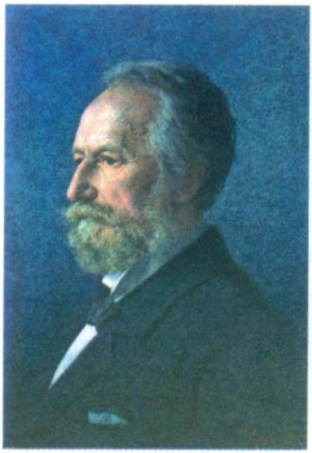
Why was the development of contact lenses a boon to those with poor vision?

If you have poor vision and wear spectacles, you know that they can be quite a bother. However, many of the problems associated with spectacles can be avoided if you opt for contact lenses.

A contact lens is a small, shell-shaped lens used to correct vision. It is placed directly over the cornea which is the transparent, or clear, tissue over the pupil and the iris, or coloured part of the eye.

Three Europeans are generally credited with the invention of the contact lens. They are Adolf Eugene Fick, Eugene Kalt, and August Muller. The first contact lenses were quite uncomfortable to wear for long periods, and needed getting used to.

Today's contact lenses are soft, easy to insert, and perfectly safe to use for long periods of time. Contact lenses offer several medical advantages over spectacles. In many cases they are more effective than glasses in restoring sight. They also allow people to play sports without having to worry about breaking their glasses! Today, there are even disposable lenses that are designed to be worn for a week, and then thrown away.



Adolf Fick

Laser Eye Surgery

What is the advantage of laser surgery in eye operations?

Laser eye surgery is a common form of eye surgery that uses lasers. Lasers are high energy light beams that can be used for cutting or welding.

Laser surgery is especially useful in delicate procedures like eye operations. This is because it gives the surgeon a high degree of precision and control. As a result, there is less risk of damage to other tissues. There is also less risk of infection with laser surgery, and it does not require a hospital stay. In fact, many people welcome this quick procedure as the most convenient way to resolve their eye problems.

However, you must always remember that your eyes are one of the most important organs in your body and you will need to be extra careful before you have any surgery done on them.

STAR FACT

Myths and Facts

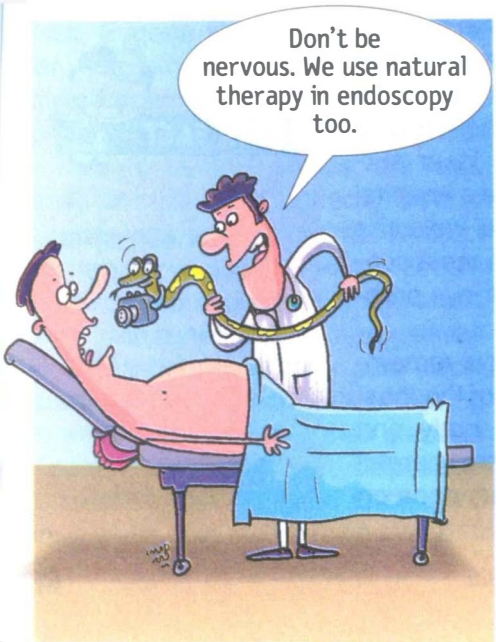
There are many myths about laser surgery but most are just that- mere myths. The plain fact is that laser surgery is quite painless and safe, if done by an experienced doctor.

Endoscope

What is an endoscope?

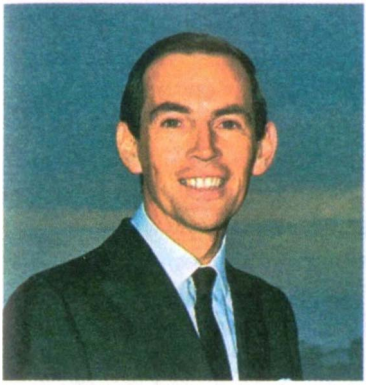
An endoscope is a medical instrument that allows a doctor to observe the inside of the body without performing major surgery. It is a long flexible tube with a lens at one end and a video camera at the other.

The end with the lens is inserted into the patient, through one of the body's natural openings. Light passes down the tube to illuminate the relevant area. The video camera magnifies the area and projects it onto a television screen. This enables the doctor to see the area where the problem lies.



The first endoscope had a rigid tube, and was invented over a hundred years ago. They have been developed for many parts of the body. Each has its own name, depending on the part of the body it is about to investigate.

An endoscope is an important tool for diagnosing certain illnesses. Specially designed endoscopes can also be used for simple surgical procedures.



Christiaan Barnard

Leeches for Wounds

In the past, wounds were often treated with leeches. These leeches were attached to the flesh of a patient, and would suck up blood from the wound. Their unique saliva causes blood flow to increase and prevented clotting. As a result, the patient could bleed for hours. This allowed oxygenated blood to enter the wound area until veins re-grew and regained circulation.

How has heart transplant surgery changed medical history?

A heart transplant is a surgery to remove a person's diseased heart, and replace it with a healthy heart.

In 1967, a human heart from one person was transplanted into another by a South African surgeon named Dr. Christiaan Barnard in Cape Town.

In early December, Dr. Barnard's surgical team removed the heart of a 25-year-old woman who had died following an auto accident, and placed it in the chest of Louis Washkansky, a 55-year-old man dying of heart damage. The surgery was the first of its kind.

The patient survived for eighteen days. In the 1970s, the development of better anti-rejection drugs made transplantation more viable. Dr. Barnard continued to perform heart transplant operations, and by the late 1970s many of his patients were living up to five years with their new hearts.

The first heart transplant surgery was truly an extraordinary event, which changed the history forever.

Alexis Carrel

What was the impact of the introduction of microsurgery?

Microsurgery is a relative new surgical technique. It is performed on very small body parts, using specialized instruments.

Microsurgical procedures are performed on parts of the body that are best observed under a microscope. Examples of such structures are small blood vessels, nerves, and tubes. Alexis Carrell, can be said to be the pioneer in this field.

In 1912, he invented a way for sewing large blood vessels together. Later, with the introduction of microscopes, better needles, and fine silk threads, it became possible to sew and repair even small blood vessels.

As a result, fingers, hands, and arms which have been cut off in accidents can now be rejoined successfully. Today, microsurgery can be lifesaving.

Neurosurgeons can treat vascular abnormalities found in the brain, and cancerous tumours in the brain can also be removed.

Jarvik 7

What is the Jarvik 7?

The Jarvik 7 is an artificial heart made of plastic and metal. Named after its designer, Robert Jarvik, the Jarvik 7 was designed to function like the natural heart.

In 1982, surgeons at the University of Utah implanted the device in a patient named Barney Clark. He survived with the Jarvik 7 for 112 days. By the late 1980s, surgeons at 16 centres, used the Jarvik 7 as a bridge to heart transplantation in more than 70 patients.

New devices came along, each not a permanent solution, but rather, as a temporary 'bridge' to keep patients alive until they could receive the transplant of a real heart.

After another decade and a half of research and improvements, the Jarvik 7 heart became the first total artificial heart implanted as a permanent replacement for a hopelessly diseased natural heart.

Though the device in its original form is no longer in use, Robert Jarvik's invention was a truly pathbreaking one in medical science.

Test Tube Baby

In 1978, history was created with the birth of Louis Brown. She was the world's first test tube baby.

Allan Cormack

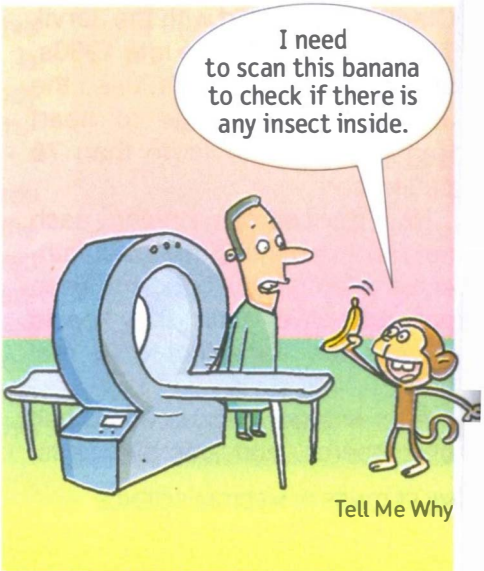
How did CT scans revolutionize medical diagnosis?

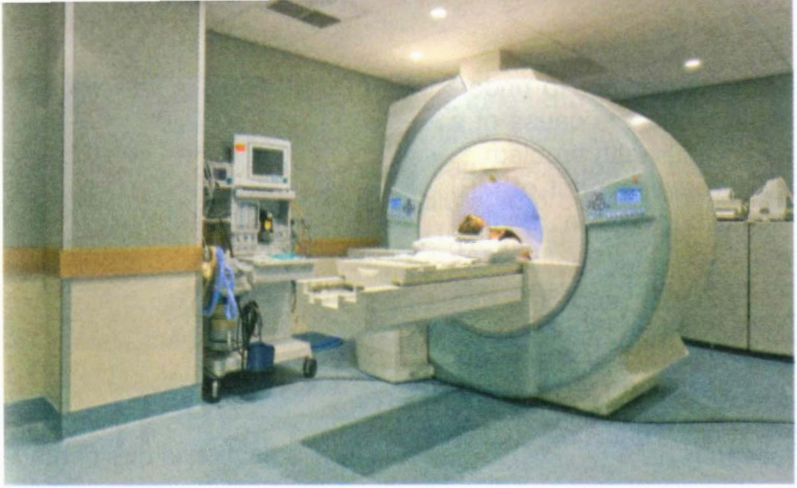
A CT scan or computed tomography scan uses X-rays to make detailed pictures of parts of your body, and the structures inside your body. CT or computed tomography was developed independently by engineers named Sir Godfrey Hounsfield and Dr. Allan Cormack.

For their work, Hounsfield and Cormack were jointly awarded the Nobel Prize in 1979. Robert S. Ledley, a physicist, was credited with the invention of the first full-body CT scanner machine. Before the advent of CT scans, doctors relied on X-ray images, which showed only hard tissue such as bone.

A CT scan, on the other hand, gives images of bone, soft tissues and blood vessels all at the same time. CT scanning provides medical information that is different from other imaging examinations.

CT scans are highly accurate, and play important roles in helping doctors make an accurate diagnosis. This painless and noninvasive procedure assists radiologists in quickly identifying cardiovascular diseases, infectious diseases, trauma, and certain types of cancer as well.





MRI Scanner

What is MRI?

The letters MRI stand for magnetic resonance imaging. It was Nikola Tesla who first discovered the rotating magnetic field, the phenomenon that made magnetic resonance imaging possible, in Budapest, Hungary in 1882.

An MRI scanner uses a strong magnetic field and radio waves to create detailed images of the organs and tissues within the body. The scanner itself typically resembles a large tube with a table in the middle, allowing the patient to slide into the tunnel.

An MRI scan is one of the most sophisticated diagnostic tools available to a doctor. It

1000 times Stronger

An MRI machine has a magnetic field that is 1000 to 4000 times stronger than the Earth's magnetic field. The image generated by an MRI is not a photograph. The machine uses a magnetic field, radio waves, and computers to map radio signals generated by each cell in response to the workings of the machine.

helps him or her to understand better the cause of a particular health problem.

The development of MRI revolutionized the medical world. Since its discovery, doctors and researchers have refined techniques so as to use MRI scans to not only assist in medical procedures, but also aid in research.

Why is the eradication of smallpox a medical milestone?

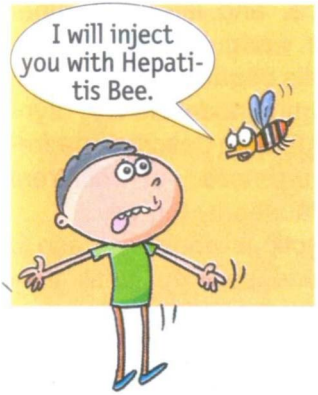
Smallpox is one of history's most dreaded diseases,

Logo of WHO

and its eradication is one of medicine's greatest triumphs. Smallpox is caused by either of two virus variants, Variola major and Variola minor, which are highly contagious, and lethal.

Throughout history, from the time of the pharaohs, smallpox has been the most devastating of all killer diseases. It kills 30 per cent of those infected, and there is no effective treatment for it. Therefore, the discovery of a vaccine for smallpox was one of the greatest boons for mankind.

In 1967, the WHO launched a campaign to eradicate smallpox. All the nations of the world joined hands in this effort. The last naturally occurring case of smallpox has been documented in 1977. By May 1980, it was officially listed as being eradicated, and the world heaved a sigh of relief!



causes a long-term infection.

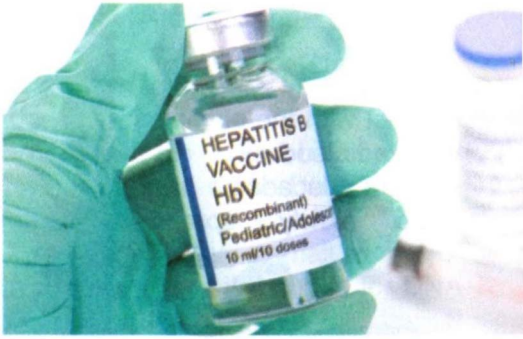
Over time, it can damage the liver. It can cause scarring of the organ, liver failure, and cancer. Hepatitis B can be fatal if it isn't treated. The disease spreads when people come in contact with the blood, open sores, or body fluids of someone who has the virus.

The Hepatitis B virus was discovered in 1965 by Dr. Baruch Blumberg who won the Nobel Prize for his discovery. Four years after discovering the virus, Blumberg and his associate, a microbiologist named Millman developed the first Hepatitis B vaccine.

Many improvements were made on the original vaccine. It is now given to babies as soon as they are born, to give them lifelong protection against the disease.

Why was the Hepatitis B vaccine an important discovery?

Hepatitis B is a virus that infects the liver. Sometimes, the virus



Hepatitis B Vaccine

STAR FACT

One of Two

Two highly infectious and deadly diseases have been wiped out from the surface of the Earth. The first is smallpox. The second is rinderpest. This killer disease was declared eradicated in 2011.

Why was the identification of HIV a significant medical breakthrough?

The letters HIV stand for human immunodeficiency virus.

Scientists identified a type of chimpanzee in West Africa, as the source of HIV infection in humans. They believe that when humans hunted these chimpanzees for meat, they came into contact with the chimp's infected blood.

Over decades, the virus slowly spread across Africa, and later into other parts of the world. In 1982, public health officials began to use the term 'acquired immunodeficiency syndrome', or AIDS, to describe the frequent occurrences of different infections, caused by the virus.

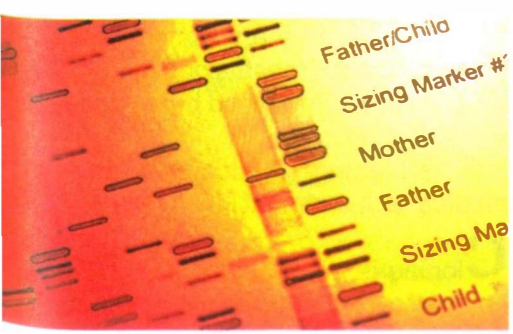
These infections would increase in frequency and severity, untill they became fatal. In 1984, a team in France led by Luc Montagnier isolated, and identified the virus which attacked, and destroyed white blood cells. It was only then that the real cause for AIDS was understood. Though there is no cure for AIDS, it is now known that it can be prevented by taking certain precautions in one's lifestyle.

The Red Ribbon- A Symbol of Solidarity with those Living with AIDS

CURIOUS FACT
First Appearance
The earliest confirmed case of AIDS in humans comes from Kinshasa, the capital of the Democratic Republic of the Congo. It was identified from a preserved tissue sample from 1959. Soon, it spread all over the world.

What is DNA fingerprinting?

DNA fingerprinting is a test to identify and evaluate the genetic information, or DNA, in a person's cells. Nearly every cell in a person's body contains the same complete set of DNA. The test is called a 'fingerprint,' because just as it is very unlikely that any two people would have exactly the same physical fingerprint, it is also very unlikely that any two people would have exactly the same DNA information.



DNA Fingerprint data on a Paper

Only a small sample of cells is needed for DNA fingerprinting. A drop of blood, or the root of a hair, contains enough DNA for testing. The test is used to determine whether a family relationship exists between two people. It is also used to identify organisms causing a disease.

Finally, DNA fingerprinting is an important tool to solve crimes. For example, DNA isolated

Data Banks

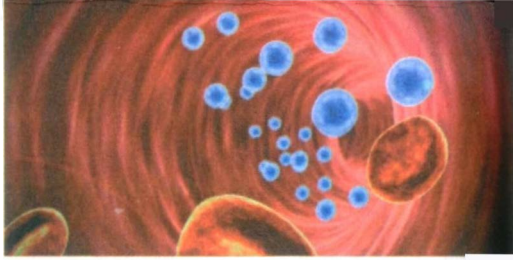
A DNA databank is a database of DNA profiles. It can be used in the analysis of genetic diseases, to establish relationships, and to identify convicted criminals. Such databases are maintained in many countries of the world.

from dried blood, saliva, or even a hair found at a crime scene, can be compared to a DNA sample collected from someone suspected of a crime, to prove his or her innocence or guilt.

Why is the development of artificial blood important in medicine?

Artificial blood is a product that acts as a substitute for red blood cells. It is designed for the sole purpose of transporting oxygen and carbon dioxide throughout the body.

In the past, medical practitioners tried numerous substances such as beer, urine, milk, plant resins, and sheep blood as a substitute for blood. A significant breakthrough in the development of artificial blood came in 1883, with the creation of a solution composed of sodium, potassium, and calcium salts.



Blood Cells

Research in this area gained more importance in 1986, when it was discovered that HIV and hepatitis could be transmitted via blood transfusions. Unlike donated blood, artificial blood can be stored for over a year or more. Currently, there are several companies working on the production of a safe and effective artificial blood substitute.

However, at present, the various blood substitutes all suffer from certain limitations. In the future, it is anticipated that new and longer lasting artificial blood will be developed.

This is of utmost importance, because of both the scarcity of real blood for blood transfusions, and the danger of infected blood being used.

Why is cloning considered a great medical achievement?

Cloning is the process of creating an exact genetic replica of a cell, tissue, or organism. A clone is like a carbon copy, or an identical twin of

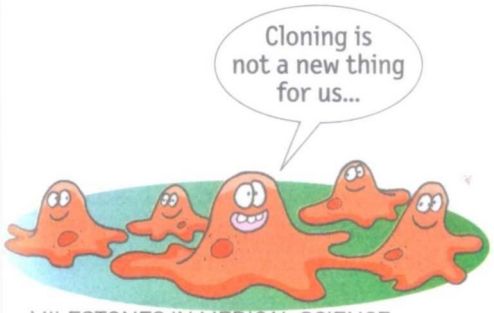
the original. The first cloning of an animal was done in the 1880s by German biologist Hans Driesch, who cloned a sea urchin from an embryo cell.

Scientists at the Roslin Institute in Edinburgh, UK, made history on 5th July 1996, when they successfully cloned a sheep.

Dolly

The cloned sheep was named Dolly. In the process of cloning, the scientists extract the DNA from an animal cell, and implant it into an egg cell taken from another animal. Before implanting it, the DNA of the recipient cell is removed.

Dolly the sheep was therefore, the exact copy of her mother. The idea of cloning can be exciting and frightening at the same time. It has been a concept that science fiction writers visualized, but it is becoming a reality in today's world. Once the techniques are perfected, cloning may be used in preserving endangered species, and for reviving extinct species as well.

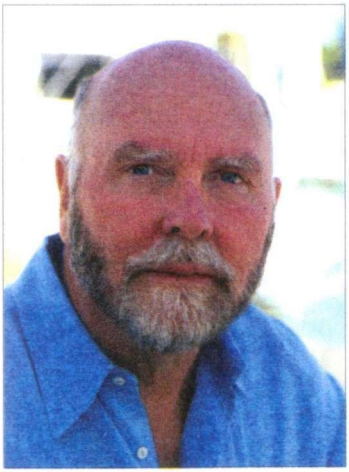


Four Dollys

The cloned sheep Dolly was also used to produce further clones. Four clones derived from Dolly's cell line are alive and healthy, and nine years old.

What is the Human Genome Project?

A genome is an organism's complete set of DNA, including all of its genes.



John Craig Venter - One of the First Scientists to Sequence Human Genome.

Each genome contains all of the information needed to build and maintain that organism. In humans, a copy of the entire genome—more than three billion DNA base pairs—is contained in all cells that have a nucleus.

The Human Genome Project was an international research effort to determine the sequence of the human genome, and identify the genes that it contains. It remains the world's largest collaborative biological project.

The work of the Human Genome Project has allowed researchers to begin to understand the blueprint for building a person. As researchers learn more about the functions of genes and proteins, this knowledge will have a major impact in the fields of medicine, biotechnology, and the life sciences.

Mind Boggling

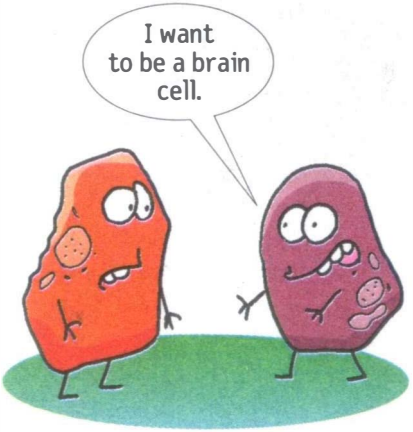
Stem cell research might make it possible to clone babies in the future. Isn't that a mind boggling thought?

What is the significance of stem cell research?

Stem cells are mother cells that can develop into any type of cell in the body. Stem cells can become cells of the blood, heart, bones, skin, muscles, brain and other organs.

When a stem cell divides, it can either remain as a stem cell, or it can develop into any other type of cell. Stem cells are found in the early embryo, the foetus, amniotic fluid, the placenta, and umbilical cord blood.

After birth, and for the rest of life, stem cells continue to reside in many sites of the body, including skin, hair follicles, bone marrow and blood. In the growing body, stem cells are responsible for generating new tissues, and once growth is complete,



stem cells are responsible for repair and regeneration of damaged and ageing tissues.

Stem cell science is an extremely fast moving field of research, with new breakthroughs being reported almost daily. This field of research represents an exciting area in medicine, because of the stem cell's potential to regenerate.

An Artificial Robotic Liver

Why is the development of the artificial liver exciting?

The liver is an organ that is vital for life. It stores energy in the form of sugar, and makes it available to the body in case of need.

There are many types of liver diseases, and liver failure is a life threatening condition. The world's first artificial liver has been grown from stem cells by British scientists. It is the size of a small coin.

It was created from blood taken from babies' umbilical cords just a few minutes after birth. Within two years, the artificial liver can be used to test new drugs, reducing the number of animal experiments.

In fifteen years' time, entire livers could be grown in the lab, and then be transplanted into human beings, thus saving lives that would otherwise have been lost.

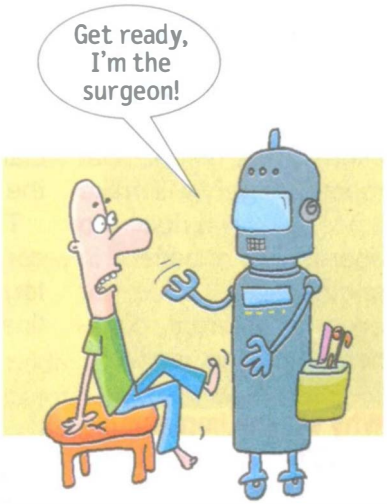
Why is robotic surgery a revolutionary development?

Robotic surgery is a method of performing surgery using very small tools attached to a robotic arm. The surgeon controls the robotic arm with

a computer. He first makes small cuts to insert the instruments into the patient's body.

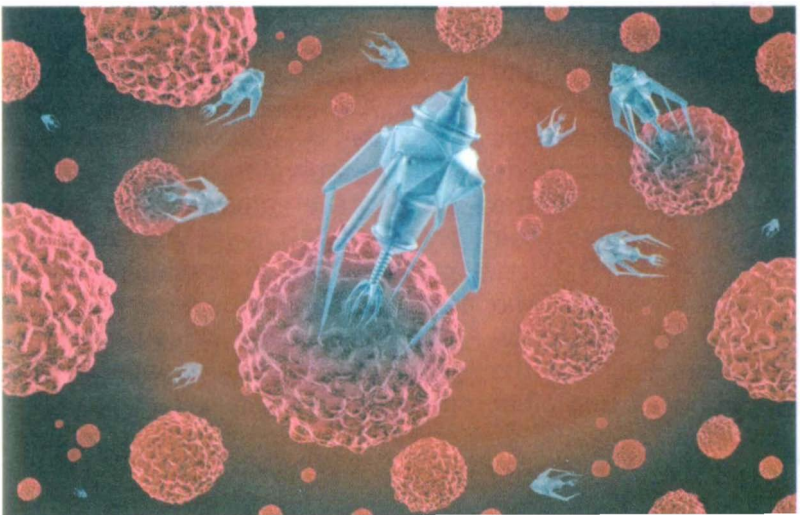
A thin tube with a camera attached to the end of it- called an endoscope - allows the surgeon to view enlarged 3-D images of the area being operated on, as the surgery is taking place. The robot matches the doctor's hand movements to perform the procedure, using the tiny instruments.

Robotic surgery has many advantages over conventional surgery in that there is faster recovery, less pain and bleeding, less risk of infection smaller scars, and shorter hospital stay.



Robotic surgery is not ideal for all surgeries, but it has replaced traditional open surgery in many fields, including, most notably, urology and gynaecology.

A Nano Robot



For the future, doctors are anticipating the growth of tele-medicine and long-distance operations. This means that robotic surgery will make it possible for a doctor to operate on a patient in another city, state, or even a different continent! Amazing, isn't it?

Why will the implantable artificial kidney bring new hope to patients suffering from kidney diseases?

Today, patients suffering from kidney failure have two options- dialysis or kidney transplantation. Dialysis is a treatment that filters and purifies the blood using a machine. This helps keep your body in balance when the kidneys can't do their job.

However, those who undergo long-term dialysis treatments run the risk of developing other medical conditions. A kidney transplant is a major operation, and getting a donor is sometimes difficult. This is why the prospect of an artificial kidney that can be implanted in the body is an exciting one.

This innovation may be able to completely replace current dialysis for people who have reached the final stages of kidney disease.

Artificial Kidney Units

Vanderbilt University Medical Centre nephrologist and associate professor of medicine William H. Fissell IV, MD, is making major progress on an implantable artificial kidney. The device uses microchip filters, and living kidney cells that will be powered by a patient's own heart.

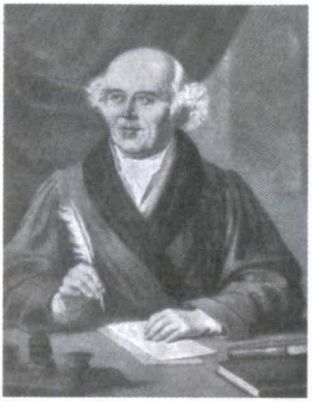
Once it is commercially produced, it will transform prospects for people whose kidneys have failed,and who have to rely on dialysis, or the rare chance of a transplant to stay alive.

Why is it said that the introduction of homeopathy changed history?

Homeopathy is a system of medicine that was established by a doctor named Samuel Hahnemann in the 19th century. He did not have faith in the usual treatments like blood letting, and other methods that doctors relied on to treat patients during that time. So, he experimented with a different form of treatment, and established a new system of medicine that he called homeopathy.

Homeopathy is based on the theory that an ill person can be treated using a substance that can produce symptoms similar to those of the illness in a healthy person. A homeopathic doctor prescribes treatment after taking into consideration both the physical state of the body, and the patient's mental and emotional state also.

Although homeopathy is widely accepted today, it has not replaced conventional medicine, and is still regarded as 'alternative medicine'.



Samuel Hahnemann

Invited Disease?

In Samuel Hahnemann's first experiment, though perfectly healthy at the time, he found that by giving himself repeated doses of cinchona bark, he brought on all the symptoms of a malaria attack.

● *Sneha Rao*

MEDICAL SCIENCE IN INDIA

Why is Ayurveda called India's greatest gift to the world?

Ayurveda is a system of medicine that is more than 5000 years old. It is truly India's gift to the world.

According to legend, the god of physicians, Dhanvantri, is the source of this system of holistic and natural healing.

Ayurveda is a science and an art that depends entirely on Nature for its cures.

Ayurvedic preparations are entirely herbal, and Nature itself supplies the raw materials- leaves and flowers, roots and stems. It is holistic healing- an ayurvedic physician does not treat just the disease, but the person.

Purity- physical, mental and spiritual – is the core of the treatment. Diet and exercise, physiotherapy and massages, yoga and meditation are all part of the Ayurvedic regime.

Today, Ayurveda is recognized as an alternative system of medicine, and is practiced worldwide.

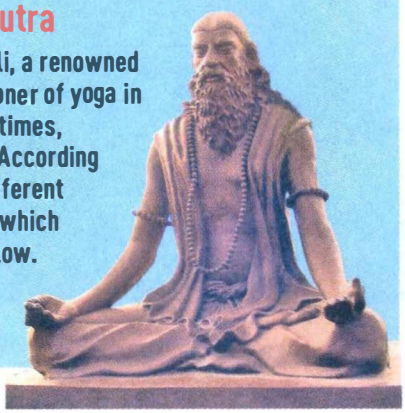
CURIOUS FACT

Siddha Medicine

One of the oldest systems of medicine in India and the world, is Siddha medicine. It is attributed to the Sage Agastya, and originated in South India.

Yogasutra

Patanjali, a renowned practitioner of yoga in ancient times, wrote a treatise called Yogasutra. According to this treatise, our bodies have different channels known as nadis, through which divine energy and consciousness flow. The body also has energy centres known as chakras.



Patanjali

How has yoga helped millions over the centuries?

Yoga is a system of physical, mental, and spiritual discipline that has its roots in India. Even before the Vedas or holy scriptures of Hinduism were written, the sages of yore had developed practices that strengthened the body, calmed the mind, and brought peace to the soul.

Yoga has become immensely popular all over the world as a physical exercise that brings about remarkable results. Indians however, believe that yoga is much more than a series of postures and exercises that have a beneficial effect on the body.

They know that the practice of yoga is a spiritual process as well, that disciplines the body, mind, and soul with remarkable results that totally relax, revitalize and rejuvenate a person, and by doing so, brings about remarkable cures for many conditions.

Why were Atreya's teachings important?

Atreya was one of the greatest teachers of Ayurveda in ancient times. A descendant of one of the hermit called Atri, Atreya was employed as the personal physician of King

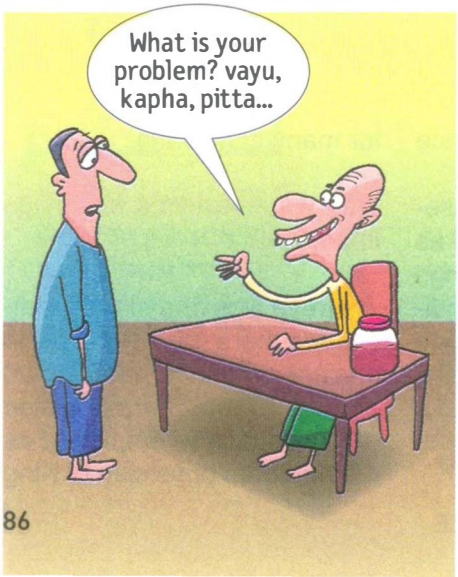
Atreya with his Students

Nagnajit of the Gandharva Kingdom of ancient India.

Even though there are many other claimants, he is widely believed as the author of the Bhela Samhita, which is the third of the three founding texts of Ayurveda. It was dated to a period of 6th century BC.

According to Atreya, the human body contains three elements- vayu, kapha and pitta. Vayu regulates the psychic and nervous functions, kapha is responsible for the metabolic activities, and kapha serves as the lubricant for all the organs of the body.

Charaka Samhita, the famous work written by Charaka, is believed to be inspired from Atreya's teachings.



CURIOUS FACT

Trinity

Charaka, Sushruta and Vagbhata are three of the greatest names in the history of Ayurveda. They are sometimes referred to as the 'Trinity' of Ayurvedic knowledge.

● *Ryan Thomas*

Why is it said that Agnivesha Samhita revolutionised Indian medicine?

Ancient India witnessed many scholars who made significant contributions in the field of medical science.

One among them was Agnivesha, who was the pupil of Atreya. His studies and writings on Ayurveda made a significant impact on medical science. The Agnivesh Tantra or Agnivesha Samhita, based on Atreya's teachings is a lost text on Ayurveda, and was the foundational text of the Agnivesha school, i.e., one of the six schools of early Ayurveda, the others being Parashar, Harita, Bhela, Jatukarna and Ksharpani.

The text is mentioned in the Charaka Samhita says: 'The Agnivesh Tantra as written by Agnivesha is compiled, edited and modified by Charaka'.

STAR FACT

Priceless

The Charaka Samahita, was not only followed by Indians, but was translated into many languages, including Arabic and Latin. It remained a standard textbook almost for 2000 years.

What were the contributions of Jivaka?

Jivaka was an ancient Ayurvedic physician, the disciple of Sage Atreya. Jivaka studied medicine for seven years and his unusual skill as a physician and a surgeon became known far and wide. He

was called upon to treat kings and princes, including King Bimbisara himself.

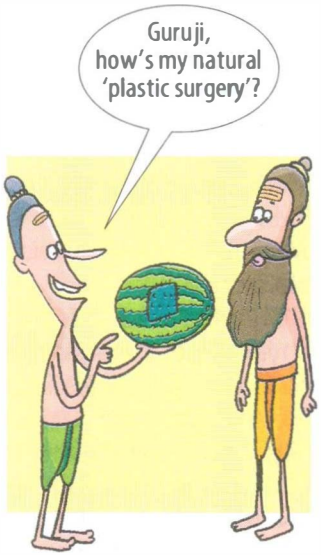
But of all the distinguished people Jivaka attended to, his greatest pleasure was to attend to the Buddha, which he did three times a day. Jivaka is famous for his amazing powers of observation and intuition.

He proposed the use of purgatives for constipation, abdominal surgery for intestinal obstruction, and the use of herbal remedies for wound healing.

Realizing the advantages of having a monastery close to his house, Jivaka built one in his mango garden. He invited the Buddha and his disciples to the monastery, offered alms, and donated the monastery to the Buddha and the monks. After the blessing ceremony of this monastery, Jivaka attained the first stage of sainthood.

Civilized

The Indus Valley civilization has yielded evidence of dentistry being practiced as far back as 7000 BC. This earliest form of dentistry involved curing tooth related disorders with bow drills operated by medical practitioners at that time.



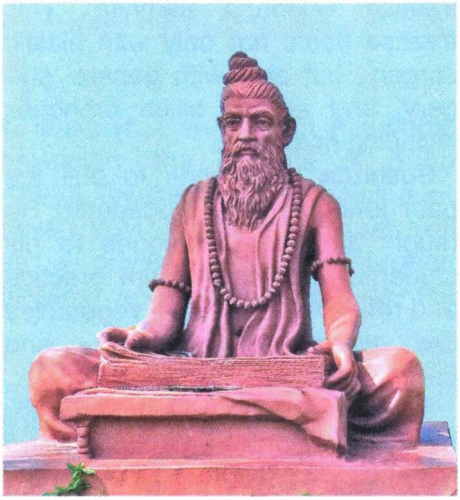
Why do we say that plastic surgery has its roots in India?

Sushruta, who lived in 600 BC, at least 150 years before Hippocrates, is a famous Ayurvedic physician and surgeon. He is credited as being the very first surgeon to perform plastic surgery.

Sushruta vividly described the basic principles of plastic surgery in his famous ancient treatise 'Sushruta Samhita'. This treatise deals not only with plastic surgery, but also with general surgery, and all the allied branches including midwifery.

Sushruta used wine to dull the pain during surgical procedures. He taught surgical techniques to his students and made them practice and refine their skills on vegetables like watermelon, gourds, and cucumbers.

Sushruta is best remembered for his contributions to rhinoplasty, or reconstructive surgery of the nose. In ancient times, amputation of the nose was frequently done as a punishment for criminals, war prisoners, or people who indulged in adultery. The practice of rhinoplasty slowly started as a result of the need to reconstruct the external nose, and later developed into a full fledged science, thanks to Sushruta.



Charaka

Why is the Charaka Samhita a milestone in the development of medicine?

Charaka, one of the principal contributors to the ancient art and science of Ayurveda, is sometimes referred to as the 'father of Indian medicine.'

The 'Charaka Samhita,' his monumental work, revolutionized the existing system by putting forward the concept that health and disease are not predetermined. Till then, prayer, rituals, and superstitions had played an important role in the treatment of an illness.

Charaka did away with such misconceptions. He believed that disease was the result of natural causes, and therefore natural, rather than spiritual, means were necessary to enable a cure.

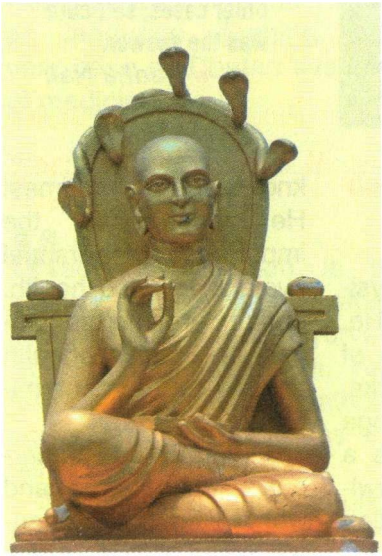
Charaka was the first physician to present the concept of digestion, metabolism, and immunity. His book contains 120 chapters, and is divided into eight sections, covering anatomy, physiology, diagnosis, and treatment. There were cures for diseases related to almost every part of human body. The treatise contains many remarks- some in the fields of physiology, etiology and embryology -which are held in reverence even today.

One of the famous of these remarks is 'A physician who fails to enter the body of a patient with the lamp of knowledge and understanding can never treat diseases'.

How did Nagarjuna change the way medicine was practiced?

Modern medicine recognizes Paul Ehrlich who received the Nobel Prize in 1908 for his work on immunity, and considered him as a pioneer in the field of chemotherapy.

But if we look deeper into ancient Indian texts, we find references to Nagarjuna, who could well hold the honour of being called the 'father of chemotherapy.'



Nagarjuna

STAR FACT

A Medical Monk

Nagarjuna was associated with the Madhyamik School of Buddhism, and also with a movement called 'Shunyavad'. He was thus both a monk, and a teacher of medicine.

He is believed to have been an alchemist who worked extensively with mercury, and advocated the use of chemical cures, rather than preparations made from herbs and vegetables.

An alchemist par excellence, he compounded many specially concocted chemicals referred to as bhasmas. Nagarjuna rewrote Sushruta's text into what we currently know as the Sushruta Samhita. He described details of the circulatory system, and referred to blood as rakta dhatu. Famously referred to in ancient Indian texts as 'Bodhisattva Nagarjuna', considerable doubt exists about the period during which he lived.

Therefore, it is quite likely that we are dealing with more than one person when we consider all that is attributed to Nagarjuna.

Self Cure

Vagbhata, a disciple of Charaka, believed that the body would heal itself most of the time- 85 per cent of the time, in fact. According to him, only 15% of the diseases of that time could be cured by a doctor. In all the other cases, self cure was the answer.

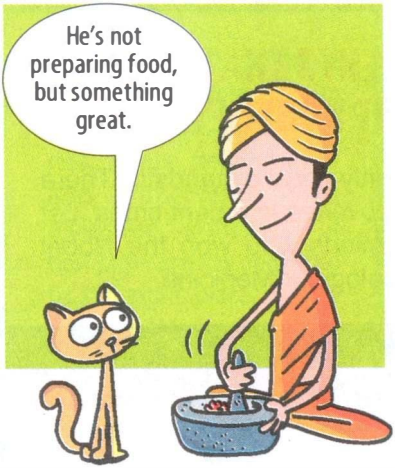
● *Radha Nair*

Why are the contributions of Vagbhata considered important?

Vagbhata, a noted Buddhist physician, lived in the 12th century. He, along with his son, wrote three of Ayurveda's most famous works, Ashtanga Sangraha and Ashtanga Hridaya. These texts were more a compilation of the existing knowledge, rather than new information being added.

Vagbhata broke with tradition by questioning the concepts, ideas, and knowledge of the times. He emphasized the importance of personal hygiene to good health, and understood the danger to public health caused by the contamination of rivers.

He prepared numerous antidotes, and worked on their formulae, some of which are in use to this day. Some of the work of Vagbhata,



especially Ashtanga Hridaya was translated into the Tibetan language, forming the very base of Tibetan system of medicine.

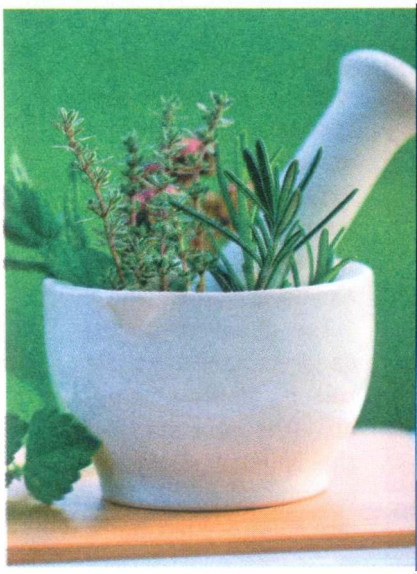
What is the Madhava Nidanam?

Madhava Nidanam is a medical treatise, named after its author, the famous ayurvedic physician, Madhava. He was one of the leading pathologists and diagnosticians of his times.

The book was written around the 7th century. It deals primarily with disease classification, and gives detailed description of hundreds of diseases with their characteristic signs and symptoms.

It also lays down the five methods of systematically evaluating a disease. Madhava Nidanam was recognized as one of the most authoritative works on the subject, for close to thirteen centuries.

This remarkable work enjoyed a great reputation not only in India, but even in other countries, as can be judged by its translation into many other languages, and the innumerable commentaries about it.



ACHIEVEMENTS THAT WON THE RECENT NOBEL PRIZES

The field of medicine is certainly not at a standstill. There have been many valuable discoveries in recent times. Let us meet the great scientific minds who won the Nobel Prize in recent years, in Physiology or Medicine.

2011

This year, the Nobel Prize went to two achievements that revolutionised our understanding of the immune system.

One half of the Prize was for discoveries concerning our innate immunity, which is the first step in the body's immune response. Joint winners: Bruce Beutler and Jules A. Hoffmann.

The discovery of the dendritic cell and its role in adaptive immunity (the later stage of the immune response), won the other half. Winner: Ralph Steinmann.

2012

A groundbreaking discovery was honoured with the Nobel Prize in 2012. Two scientists discovered that mature, specialised cells can be turned into stem cells that are capable of developing into various tissues of the body. Their findings have revolutionised our understanding of how cells and organisms develop, and have valuable medical applications. Winners: Sir John B. Gurdon and Shinya Yamanaka.

2013

Three scientists were honoured this year, who solved the mystery of how the cell organizes its transport system. Each cell is like

a factory that produces and exports molecules, in small packages called vesicles. These Nobel Laureates discovered the molecular principles of how this cargo is delivered to the right place. Knowledge of the system gives insights into a variety of diseases.Winners: James E. Rothman, Randy W. Schekman and Thomas C. Sudhof.

2014

This year's Nobel went for solving the mystery of how we find our way, and remember it, too! Three scientists discovered cells that constitute a positioning system in the brain - an 'inner GPS'. It is this system that helps us know where we are, and how to find the way from one place to another. And to store this information for later use. Winners: John O'Keefe, May-Britt Moser and Edward I. Moser.

2015

Two life-saving discoveries shared this year's Nobel Prize.

a. One half was for discovering a new therapy for infections caused by parasitic worms. Joint winners: William Campbell and Satoshi Omura.

b. The other half was awarded for discovering a life-saving drug against Malaria. Winner: Youyou Tu.

2016

This year, the honour went for the discovery of the mechanisms behind autophagy, a fundamental process for degrading and recycling cellular components. The word 'autophagy' literally means 'self-eating', and refers to a cell destroying its own contents by enclosing it in membranes. This is of great importance because autophagy is involved in several conditions including cancer and neurological diseases. Winner: Yoshinori Ohsumi.

Corrections & Clarifications

Shouryodeep Chakraborty, points out a correction to the Tell Me Why issue on islands (September). He refers to the mention on Page 35, where it is wrongly stated that Marajo island is the world's largest freshwater island. In fact, Manitoulin owns the title.

Saswat Rautray, Bhubaneswar, points out another mistake in the same issue. On page 65, it is wrongly mentioned that the country Bahrain got independence on 14th August, 1971. Actually, it got independence on 15th August, 1971.

Thank you readers for your valuable feedback.
- Editor

PHOTO QUIZ-9 WINNERS

Winners of the Photo Quiz-9 held in the September issue of Tell Me Why.

1. Ahmad Nawed
Ismail Shaheed Mill Road, Near Airtel Tower, M.M. Colony, Siwan, Bihar.

2. Sanya Singh
S/o Mr. Sunil Kumar Singh
88-III, North West Motibagh, New Delhi.

3. Geetanjali Deepak
9D, Kadavill Court, Arangath Cross Road, Pullepady, Kochi, Kerala.

4. T.S. Ranjana
D/o Mr. T.A. Sasi, No.23\91, Gujji Main Road, Anna Nagar [East], Chennai.

5. Aditya Sharma
S/o Mr. Arvind Sharma, A- 203 (Ground Floor), Today Blossom- 1, Sector- 47, Gurgaon.

6. Pranav Aditya Singh
63 Palash Parisar, Gulmohar, Bhopal, MP.

7. Krishnendu Mandal
C-18, Sector - D, LDA Colony, Near CMS School, Kanpur Road, Lucknow.

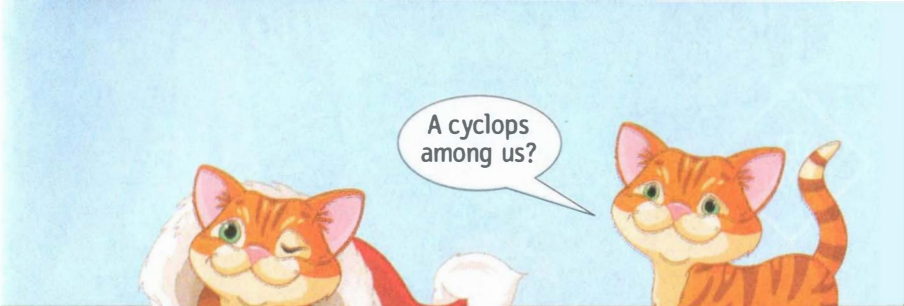
8. Gaurav Hiten Parekh
C/o Mr. Hiten Parekh, 103-Rhutu Park Apartment, Near Tadkeshwar Temple, Valsad, Gujarat.

9. Sreerag A.
S/o Mr. Rameshbabu K., Achyutham, Maruthi Nagar, Kallepully, Palakkad, Kerala.

10. Goureesh V Menon
Flat 3 D, Royal Enclave East, Elamana Jetty Road, Opp. River Borne Centre, Near Ambily Nagar, Tripunithura.

PHOTO QUIZ-9 ANSWERS

1.Kiwi 2.Cassowary 3.Penguin
4.Emu 5.Ostrich 6.Takahe



I Wonder Why?

Question of the Month

Cyclops

Is there an animal with only one eye?

Yes-there is one group of animals that have only one eye. These creatures are known as cyclops. They belong to the same family as that of the shrimp and lobster. But unlike them cyclops only have one eye.

Even though its name is a little scary, the creature is not scary at all. In fact, it is very small in size and you will never see one that is more than two centimetres in length. The eye of the cyclops is a median eye, that is, one which helps in detecting the changes in light. It is situated near the top of the head, between the antennae.

There is one more interesting fact about cyclops. It got its name from the mythical race of one-eyed giants called Cyclops!

• *Indhu Thomas*

Question sent by:
Namish Arora, Ludhiana.

Send us your questions
E mail: **tellmewhy@mmp.in**

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MANORAMA TELL ME WHY - MILESTONES IN MEDICAL SCIENCE

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